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ABSTRACT

The development and evaluation of Informed Strategies for Learning (ISL), an experimental curriculum to enhance children's reading comprehension, are described in this report. The report opens with a summary of the project, in which 20 modules--each focusing on a different strategy--were designed and 60 lesson plans were developed. This section also summarizes the evaluation results, which indicated that children in the experimental classes showed significant advantages over control subjects on measures of cloze performance, error detection, and metacognition, and many significant differences due to age and reading ability. The chapters in the body of the report discuss (1) the need for instruction in reading strategies, (2) the history of ISL, (3) how ISL can improve children's metacomprehension and reading comprehension, (4) how ISL can improve literal and inferential comprehension, (5) the project's exploration of the relationship between children's reading performance and reading attitudes, (6) the project's exploration of children's perceived reading competence and reading performance, and (7) the effects of ISL on children's use of context as a reading strategy. (HTH)

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Teaching Children to Control Their Reading Comprehension Skills

NIE - 82 - 0019

May 5, 1982 - June 30, 1984

FINAL REPORT

to the

National Institute of Education

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CS007970

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Summary

During the two year grant period we created, implemented, and tested methods and materials to enhance children's reading comprehension. The materials included 20 modules, each focused on a particular strategy, that were designed to be used by classroom teachers throughout the school year. More than 300 pages of information and worksheets were included in the 60 lesson plans. We also provided teachers with large bulletin board displays to be used with the lessons. The instructional methods in this adjunctive reading program emphasized group instruction, explicit information about reading strategies, and student/teacher discussions about reading skills. We provided the materials and methods to 75 teachers and reading specialists in a series of inservice workshops and meetings during the year. The excellent collaboration among researchers, teachers, and administrators facilitated the entire project and helped to maintain 100% participation and enthusiasm.

The effectiveness of the experimental curriculum, Informed Strategies for Learning (ISL), was determined by comparing children's performance in experimental classrooms with children from randomly assigned control classes in the same districts. Nearly 2000 children were tested in the fall and spring of the school year on a battery of reading, metacognitive, and motivational tasks. Children in experimental classes showed significant advantages at the post test over control subjects on measures of cloze performance, error detection, and metacognition. The data also revealed many significant differences due to age and reading ability.

We believe that ISL is a pragmatic approach to teaching students (and teachers) about strategies that promote reading comprehension. It is flexible, economical, and easily modified for students of different ages and abilities. Our emphasis on direct instruction of cognitive processes is a clear alternative to traditional teaching methods and it remedies an identified weakness in current classroom practices. The rigorous experimental test of curriculum delivered by regular classroom teachers substantiates the theoretical and practical benefits of teaching children about comprehension strategies directly.

I. The Need for Instruction on Reading Strategies

Few people would question the importance of teaching word attack skills, phonics, and sight vocabularies to beginning readers. Likewise we would expect to find small reading groups arranged by abilities in most elementary classrooms. Teachers routinely provide children in these groups guided lessons, oral reading, and various questions to stimulate them to think about their reading. But these types of skill-based activities begin to disappear in third and fourth grade classrooms and are replaced by drill-based activities. Silent reading, workbook exercises, and reading in content areas provide solitary practice. Teachers presume that these activities will allow children to develop more sophisticated comprehension strategies. Indeed, Durkin (1978-79) found that teachers in intermediate grades rarely provided explicit instruction on comprehension strategies. Furthermore, she found that teachers' manuals offered little assistance (Durkin, 1981). The manuals direct teachers to engage in question-and-answer sessions about the content of students' reading but they provide little instruction on strategies to improve comprehension.

The problem, of course, is that practice is not sufficient for many students. They never acquire effective reading strategies. This is a paradox because research has shown that strategies can be powerful aids to reading comprehension, studying, and learning (Brown, Armbruster, & Baker, 1984). The timing is even more puzzling because children from eight to 15 years of age are capable of learning a great deal about problem-solving strategies (Gagne & Dick, 1983; Paris & Lindauer, 1982; Resnick, 1983). Why do teachers fail to teach children about cognitive strategies at just the right time in their development and schooling?

The reasons may be due in part to the lack of information in professional training and published materials. Or it may be that teachers think that children are not ready to learn about strategies in elementary grades. Or teachers may think that it is too difficult to teach students these kinds of abstract reasoning. Whatever the reasons have been, it appears that our expectations were too pessimistic. Research during the past five years has shown repeatedly that students can be taught to use reading strategies through direct classroom instruction (Pearson & Gallagher, 1983). Before I discuss some practical teaching methods, though, I want to talk about some critical aspects of (a) reading strategies and (b) guided instruction.

Reading Strategies

A strategy is more than a successful action. After all, you could hit a winning shot in tennis by accident or because someone told you what to do. Likewise, students could correctly answer questions about text for reasons other than the deployment of good strategies. Strategic readers combine knowledge about the task with motivation to act accordingly. Their plans are self-generated and their actions are self-directed. Brown, Palincsar, and Armbruster (1984) reviewed many reading curricula and identified six fundamental comprehension strategies; understanding the purposes of reading, activating relevant background knowledge, allocating attention to main ideas, critical evaluation, monitoring comprehension, and drawing inferences. Despite consensus on the importance of these strategies, there are few instructional methods designed to teach students how to use them. These comprehension activities are important because strategic reading leads to self-directed learning. Awareness of cognitive strategies, their

existence, application, and benefits, promotes the development of self-directed learning. This reflection on thinking has been referred to as "metacognition" and accompanies children's acquisition of many cognitive strategies (Paris & Lindauer, 1982).

What kinds of metacognitive knowledge underlie the acquisition of reading strategies? There seems to be three categories of information that students need to acquire (Paris, Lipson, & Wixson, 1983). The first is called declarative knowledge and reflects "knowing that" propositions about reading. For example, children learn that titles provide cues to meaning and that there are differences between fiction and nonfiction. The second aspect of strategies refers to "knowing how" or procedural knowledge. For example, children need to learn how to skim by reading only occasional, high information words. The third aspect of strategic reading is knowing when to apply strategies and why they are effective. Paris, Lipson, and Wixson (1983) refer to this as "conditional knowledge" to emphasize that it is important for students to understand the pragmatic value of reading strategies. Students have to be convinced that the actions are reasonable, worth the extra effort, and functionally effective. Without a thorough understanding it seems unlikely that students will elect to use strategies without direct supervision.

Guided Instruction.

Knowing about strategies will not insure that students use them while they read. Teaching is more than telling; the information must be supplemented with a rationale for using strategies. This is where motivation blends with knowledge and where teaching and learning interact. The responsibility to use reading strategies must be shifted

from teacher to student so that learning is self-regulated and not done merely for compliance or external rewards. Students need to internalize guidance that is provided initially by someone else so that they can provide their own criticism and motivation. The steps involved in shifting responsibility can include the following forms of instruction; informing, modelling, guiding, observing, correcting, and encouraging. Repeated cycles of such learning and teaching resemble coaching more that didactic "information giving." Indeed, this type of guided learning is how parents usually teach children routine skills such as cooking, fishing, and game-playing (Rogoff & Gardner, 1984). It is also the basis for reciprocal teaching, a method used successfully by Palincsar and Brown (1984) to teach study strategies to junior high school students.

How can teachers convey information to students about the benefits of strategies and the necessity to use them on their own? Most researchers agree that interactive learning facilitates persuasion. Students need to talk with each other about the tasks and options in order to see how various plans might be implemented. Through reciprocal teaching (i.e., situations in which students and teachers exchange roles) or peer tutoring, they can act as teachers as well as students. In this fashion they can adopt the role of an external monitor for someone else just as they need to act as an internal monitor for their own reading. As Vygotsky (1978) noted, this kind of interactive learning helps to shift the responsibility for recruiting and applying cognitive strategies from teachers to students

We think that classroom dialogues are fundamental to this transfer because they permit students opportunities to express their ideas. This

allows teachers to listen to students' ideas so that they can gain an appreciation of students' concepts and attitudes about reading. Conversations in classrooms also help to "make thinking public" so that students can learn from one another. As they assert, defend, and question their ideas about their own reading and studying skills, they are being persuaded about the value of effective strategies. There are many ways in which teachers can stimulate Socratic discussions about thinking skills. We have found that these dialogues can be facilitated by using metaphors for strategies. For example, we have encouraged children as young as 7-8 years old to talk about what they need to do in order to "Be a reading detective" or "Plan your reading trip." These metaphors stimulate children to relate reading to other problem-solving tasks so they can generate similar plans and strategies for cognitive objectives such as reading, skimming, and studying. The metaphors facilitate communication about abstract skills. They make the strategies seem sensible and tangible because students can relate specific actions to each one. They can also perceive the need to use them by analogy.

In summary, teachers do not directly instruct students about reading strategies very often. This is paradoxical given the importance of strategies and the readiness of students to learn about them. Guided instruction appears to be an effective way to inform students about the existence of reading strategies. It also provides modeling, feedback, and persuasion so that students can internalize teachers' regulation of comprehension skills. Group discussions and direct instruction provide information about declarative, procedural, and conditional aspects of

strategies. Classroom dialogues also provide stimulation and motivation to use the strategies.

II. History and Description of ISL

During the past five years we have created a program for teaching strategies to third and fifth graders that we call Informed Strategies for Learning (ISL). It is based on group discussions and explicit instruction about the value of reading strategies. The fundamental purpose of each lesson is to inform students about reading strategies; what they are, how to use them, when to apply them, and why they are functional and necessary. These ideas are not often taught directly and we found that both teachers and students were eager to talk about reading strategies. In our first study, Marjorie Lipson, an experienced teacher and colleague on the project, visited two third and two fifth grade classrooms each week for four months to provide the special ISL lessons. The regular classroom teacher observed and participated in the lessons and we encouraged them to incorporate the ideas into their teaching. To help them understand and anticipate our instruction, we gave them 2-3 page lesson plans in advance of each week's instruction.

As we designed ISL, it became evident immediately that the first problem we had to tackle was how to translate abstract ideas about cognitive strategies into comprehensible notions for eight and ten-year-olds. We chose metaphors because they provide easy vehicles for communication and offer concrete bases for depicting and discussing strategies. For example, a corral of horses illustrated how "Rounding up your ideas" is similar to summarizing the main points of a story. We were pleasantly surprised to observe how quickly students grasped the analogies and how easily they extended the concepts to reading. The tangible actions of using strategies were also easy to communicate and

to recall with cues such as "rounding up ideas, searching for clues, and planning your reading trip."

Our choice of metaphors as an instructional device was fortunate because it represented active agents (e.g., detectives) using specific strategies to solve concrete problems. The correspondence to strategies for reading, and indeed writing, studying, and learning, is direct and obvious. We also realized that the metaphors were fun. They stimulated teachers and students to think analogically. I was pleasantly surprised to observe a class discussing planning to read and to hear one fifth-grader say, "You know, it's like my Dad told me about sailing. You have to have a rudder on the boat to make it go where you want. That's what a reading plan is like -- a rudder on a boat that steers you where you want to go."

But what was the actual instruction like? Each lesson began with a focus on the bulletin board. These were large colorful displays that were changed each week with a new module. Students were asked to read the title and to observe the metaphor. Discussion was directed immediately to the analogy with reading and the implications for how we read. For example, planning an automobile trip is like planning to read because you need to know your destination before you start, you need a good map, and you should observe your progress and speed along the way. These kinds of similarities were promoted by several focal questions written on each bulletin board that directed children to ask themselves questions as they read (e.g., What is my reading goal?). Following this introductory discussion, each comprehension strategy was modeled for students as they read a chart story, overhead projection, or worksheet.

As the teacher showed students how to use the strategy, she also discussed how, when, and why it helped reading comprehension.

The remainder of each lesson was devoted to guided practice. Students were given reading assignments, mostly worksheets to be read silently but also group tasks that could involve oral reading. Now students were required to generate and apply the strategies on their own, seeking help from the teacher or peers only when they became confused or thwarted. Each lesson concluded with feedback provided in group discussions so that students could share their perceptions of the benefits and problems associated with each strategy. This is a very important phase of ISL because it promotes whole class discussions of the skills students are expected to learn. Students share their feelings with each other and the teacher - an experience that is altogether too infrequent in many classrooms. These dialogues also permit teachers to assess the difficulty of the lessons as well as the effectiveness of their instruction immediately and informally. We found that whole group instruction promoted cooperation among students and removed the stigma and boredom of reading groups. The poorest readers were often the most vocal participants in discussions because they could talk about reading even if they had difficulty actually reading. An additional difference between ISL lessons and traditional reading groups is the focus on direct instruction of skills and questions about skill learning as opposed to content learning. Parenthetically, I should add that we varied the content of the passages used in ISL lessons to include poetry, new articles, fiction, history, science, etc. We also stressed the application of strategies in all reading situations and not just school tasks.

Our initial study was quite successful. The children in our four experimental classrooms showed significant gains in awareness and the use of reading strategies compared to four control classes (Paris & Jacobs, in press; Paris, Lipson, & Cross, in press). Children who understood reading strategies and goals and how to plan and regulate their reading consistently received higher scores on comprehension tests. The ISL lessons promoted awareness and use of strategies as measured by interviews and actual reading performance. For example, students in experimental classes were significantly better at using context to fill in missing words in a cloze task and they were much better at detecting errors in passages.

The success of our project encouraged us to expand ISL and to revise the lessons so that they could be used easily by regular classroom teachers. Thus, with the aid of this grant from the National Institute of Education we revised ISL to include complete lesson plans and materials for third and fifth grade teachers. Our most recent version of ISL includes 20 instructional modules grouped into units of five related skills or concepts. The first group emphasizes evaluating the task and planning how to read. The second group focuses on levels of meaning. The third group emphasizes strategies for reasoning during reading and the fourth group teachers students how to monitor and repair comprehension breakdowns. The fifth module in each set reviews and integrates the four previous skills and concepts. We found that a sequence of instruction with periodic reviews helps students to appreciate a conceptual and strategic orientation to reading.

Bulletin boards depicting the metaphors for each module served as concrete reminders to students to use the strategies. The metaphors

were used in the lessons and repeated in the worksheets so that students felt comfortable with the analogies and vocabulary (e.g., roadsigns for reading or tracking down the main idea). We used a "fading technique" to shift responsibility to students (Pearson & Gallagher, 1983). Each module included three lessons; each one required approximately thirty minutes. The first lesson introduced the strategy and provided explicit modeling on how to use it. The second lesson required students to apply it with less guidance and the third or bridging lesson required students to use the strategy in other content area assignments. In a sense, practice was informed and guided until students could use the strategies independently.

In addition to the lesson plans and materials, we also provided teachers with periodic inservice workshops in which they learned about the theoretical principles of metacognition, reading strategies, and informed instruction. They also learned about instructional formats such as group discussions, metaphors, and guided practice that are alternative to traditional reading groups. Quite frankly, much of this information was new to many teachers who had to learn about comprehension strategies themselves in order to teach them to their students. The workshops also provided opportunities for teachers to discuss how ISL worked in their classrooms. We tried to model the positive features of group discussions and problem-solving in the workshops and quite often teachers modified our lesson plans and materials to fit their teaching styles and the needs of their students. We encouraged that kind of flexibility and were pleased that all of our volunteer teachers continued with the program the entire year.

The principles of guided instruction on comprehension strategies that we developed can be extended to many other cognitive strategies and age levels. In fact, many of the teachers in our projects spontaneously developed related methods for teaching strategies in mathematics and composition. We think that the lessons were most successful when teachers used them creatively and adapted them to their own teaching styles. Thus, we encourage teachers to apply the principles of informed instruction that have worked well for us but to modify them according to the content area and level of the students.

III. Improving Children's Metacognition and Reading Comprehension with Classroom Instruction

ISL has three basic objectives. First, we want to increase young children's understanding of reading tasks, goals, and strategies by describing what, how, and why various strategies influence reading. Second, we want to provide an experimental test of the relation between metacognition and performance. Can children's reading skills and comprehension levels be promoted by teaching them information about reading strategies? Third, we want to develop an instructional method for informing children about reading that is interesting, easy to use, and suitable for young readers. ISL involves instruction given to the entire class that includes lots of discussion and teacher-student interaction so that students can increase their understanding about reading as well as their skills and motivation.

Principles of ISL

The central tenet of our approach is that reading strategies can be explained directly to children. If they perceive the strategies as sensible and useful courses of action, we would expect children to use them appropriately and spontaneously in their subsequent reading. Our emphasis is thus on how children's awareness about reading, or metacognition, can facilitate intentional use of particular strategies. Let us consider the nature of reading strategies prior to a discussion of how they can be instructed.

Strategic readers combine knowledge about the task with motivation to act accordingly. Their plans are self-generated and their actions are self-directed. Otherwise students are only following directions and they may not transfer the actions to other tasks and settings. Consider

the kinds of strategies that teachers would like to observe in 10-12 year olds. Skilled readers might evaluate the task, examine the topic, and estimate the difficulty before reading. They might pause as they read to check on their understanding. They will also probably make inferences, reread parts, and summarize the main points when they finish. These actions are unlikely if students are uninformed or unmotivated.

We created ISL methods and materials to teach students about strategies and we based our approach on three fundamental principles of effective teaching: (1) Students need to know about the skills they are expected to learn, (2) Students need the opportunity to share their thoughts and feelings about what they are learning, and (3) Students need to be guided and coached to successively better and more independent levels of performance. These key instructional activities; informing, discussing, and coaching will be discussed briefly.

Removing the mystery of reading

Beginning readers often have vague and mistaken notions about reading (Johns, 1980; Reid, 1966). They may not know word boundaries, print conventions, or even that pictures don't "tell the story." Older students may remain just as naive about the goals, strategies, and text complexities of reading comprehension (Myers & Paris, 1978). They frequently do not understand different reading goals nor how to recruit particular strategies for different purposes. Even when task goals are well-defined and understood, children may fail to invoke deliberate plans. They may not be aware of potential actions that will achieve the goal or they may not discriminate the utility of various actions and

thus behave haphazardly. A pervasive problem is the insensitivity of young children to the need to recruit any special actions.

Cognitive and developmental psychologists have examined the kinds of knowledge that are acquired as learners change from novices to experts. These accounts have emphasized two major types: declarative and procedural knowledge or knowing that and knowing how (Resnick, 1983). These kinds of knowledge are crucial for becoming strategic. Declarative knowledge includes propositions about task structure and task goals. For example, I know that most stories introduce the setting and characters in the opening paragraph and I know that my comprehension goals differ when reading newspapers and textbooks. Declarative knowledge can also include beliefs about the task and one's abilities (e.g., "Reading is boring" or "I'm a slow reader"). In sum, declarative knowledge includes propositional beliefs about the existence of task characteristics and personal abilities. It includes the kind of information that can help in setting goals and adjusting actions to changing task conditions.

Procedural knowledge includes information about the execution of various actions; knowing how to skim, how to scan, how to summarize, and so forth for reading. There are many reading procedures that children learn quickly such as the directionality of reading. Other procedures such as determining pronoun references and an author's point of view remain difficult for older children. Procedures describe a large range of actions involved in any task such as reading. They are the repertoire of behavior available to the agent who selects among them to attain different goals. Therefore, the procedures are fundamental to strategic action. Procedural knowledge is often acquired from direct

instruction or induced from repeated experience. Thus, children who are taught to skim passages may have a greater appreciation of how to skim from practice and they may be able to describe their idiosyncratic procedures for skimming in detail. It is just this kind of understanding that facilitates the development of strategies for reading.

However, declarative and procedural knowledge alone are not sufficient to ensure that children read strategically. They only emphasize the knowledge and skills required for performance and do not address the conditions under which one might wish to select or execute actions. Because strategic behavior involves intentionality and self-control, any analysis that ignores learners' motivations is incomplete. Conditional knowledge includes knowing <u>when</u> and <u>why</u> to apply various actions (Paris, Lipson, & Wixson, 1983). For example, skimming is a procedure that is only appropriate for some tasks and situations. The procedure needs to be applied selectively to particular goals in order to be a strategy. Reading only some of the words and sentences in text is not a strategy by itself; such skimming could be the result of skipping difficult words, poor visual tracking or laziness. The systematic employment of skimming to accomplish goals of speeded reading or previewing, however, would be strategic reading. Conditional knowledge describes the circumstances of application of procedures. An expert with full procedural knowledge could not adjust behavior to changing task demands without conditional knowledge.

Declarative, procedural, and conditional knowledge are necessary ingredients for strategic behavior. Students can learn about these features of reading by direct instruction as well as by practice. Part

of a teacher's job is to explicate strategies for reading so that students will perceive them as useful and sensible. This is where persuasion needs to be added to information and brings us to the second principle of ISL.

Making thinking public

Awareness or metacognition does not have to be private; knowledge about strategies can be shared among students and teachers. How can teachers convey information to students about the benefits of strategies and the necessity to use them on their own? Most researchers agree that interactive learning facilitates persuasion. Students need to talk with each other about the tasks and options in order to see how various plans might be implemented. Through reciprocal teaching or peer tutoring, they can act as teachers as well as students. In this fashion they can adopt the role of an external monitor for someone else just as they need to act as an internal monitor for their own reading. As Vygotsky (1978) noted, this kind of interactive learning helps to shift the responsibility for recruiting and applying cognitive strategies from teachers to students. Classroom dialogues are fundamental to this transfer because they provide students with opportunities to express their ideas. This allows teachers to gain an appreciation of students' concepts and attitudes about reading.

Cognitive coaching

Knowing about strategies will not insure that students use them while they read. Teaching is more than telling; the information must be supplemented with a rationale for using strategies. This is where motivation blends with knowledge and where teaching and learning interact. The responsibility to use reading strategies must be shifted

from teachers to students so that learning is self-regulated and not done merely for compliance or external rewards. Students need to internalize guidance that is provided initially by someone else so that they can provide their own criticism and encouragement. The steps involved in shifting responsibility can include the following forms of instruction; informing, modelling, guiding, observing, correcting, and encouraging. Repeated cycles of such learning and teaching resemble coaching more than didactic "information giving." Indeed, this type of guided learning is how parents usually teach children routine skills such as cooking, fishing, and game-playing (Rogoff & Gardner, 1984). Coaching students about cognitive skills includes guided practice, feedback, faded support, and generalization to related tasks so that students can recruit strategies appropriately and independently.

Instruction that accompanies aided practice offers information and assistance in task completion. Coaching implies a set of shared objectives between tutors and pupils. Expertise of pupils is the standard of success and both teacher and pupil strive to achieve it. Because learning is a joint responsibility, coaches and parents have a large stake in students' progress. After all, poor learning can reflect poor coaching.

A second objective of coaching is accurate evaluation of a pupil's starting point. Coaches need to assess what pupils know and how they perform before they can form reasonable expectations and appropriate plans for training. By coaching in the "zone of proximal development," parents can avoid imposing task redundancy that breeds boredom or overly challenging tasks that may produce failure. Assessing a pupil's starting point and adjusting standards for performance are progressive

evaluations. Parents and teachers can also assess children's willingness to be coached. They can structure tasks or arrange the environment in subtle ways so that children encounter increasing demands on their skills yet still receive incentives and rewards.

A third characteristic of coaching is mutual regulation. Shared goals, accurate assessments of pupils' readiness and willingness, and good plans may be unsuccessful if coach and pupil do not modify their behavior as they interact. Feedback and dialogues are needed so that mutual criticism is constructive. The essence of mutual regulation in coaching is the shifting of responsibility for positive direction and correction from coach to pupil. As young children learn to read, teachers and parents provide fewer supports and raise their expectations for children's unaided comprehension.

In summary, teachers do not directly instruct students about reading strategies very often. This is paradoxical given the importance of strategies and the readiness of students to learn about them. Guided instruction appears to be an effective way to inform students about the existence of reading strategies. It also provides modelling, feedback, and persuasion so that students can internalize teachers' regulation of comprehension skills. Group discussions and direct instruction can provide information about declarative, procedural, and conditional aspects of strategies. Classroom dialogues also provide stimulation and motivation to use the strategies. In the following section the methods and materials of ISL are described as examples of how these instructional principles can be implemented.

Instructional Techniques of ISL

Our methods of teaching children about reading strategies may be characterized as "direct instruction" or "informed training" (Brown, Armbruster, & Baker, 1984) because we taught children about strategies explicitly. We based our methods on several tenets of research on teacher effectiveness that emphasize the importance of (a) directing students' attention to the material to be learned, (b) providing an academic focus to learning activities, (c) insuring high levels of student participation and involvement, and (d) using frequent practice with immediate feedback. We tried to promote these features of effective teaching by designing half-hour group lessons that stimulated students to think and to talk about (as well as to use) different reading strategies. The following five techniques were part of the lessons:

1. Informed teaching
2. Metaphors for strategies and bulletin boards
3. Group dialogues
4. Guided practice
5. Bridging to content area reading

Informed teaching simply means that teachers told students what a particular strategy was, how it operates, and when and why students should use it. For example, skimming seems like such a simple strategy to adults but when you ask 8-10 year olds how to skim, many may respond by saying "You read the little words" or "Just read the first and last sentences." They often do not know why skimming can be a good preview or review technique nor do they think about the value of the strategy weighed against the extra effort. Teachers often forget how naive

students are about such strategies. But researchers and academics also often overlook teachers' naivite. Some teachers do not teach students about the declarative, procedural, and conditional knowledge of reading strategies because they do not understand those characteristics well. And there are no descriptions of these strategies in teachers' manuals. That is why ISL provides teachers with information on what, how, when, and why strategies operate so that they in turn can convey it directly to students.

When we began this project, we created metaphors for reading strategies because we wanted the strategies to be concrete, meaningful actions, and quite frankly, we could not think of any other way to make cognitive strategies sensible to young readers. It turned out, I think, to be a fortunate decision. So we drew analogies between prereading activities and "Plan Your Reading Trip" and between summarizing and "Round Up Your Ideas" and between evaluating text difficulty/reading purposes and "Be a Reading Detective." These metaphors made the strategies sensible by analogy and they provided concrete, vivid cues for imagery, recall, and discussion. Consider, for example, the quintessential comprehension strategy of every scope and sequence chart--identifying the main idea. ISL tries to teach this strategy by drawing the analogy of a sleuth using clues to "Track Down the Main Idea." The clues include pictures, titles, prior knowledge, setting, and so forth. Students are taught how to use these clues to deduce or abstract the theme of the text or main idea. Thus, the metaphor affords a vehicle for communicating information about the declarative, procedural, and conditional features of the strategy.

We also capitalized on the visual impact of our selected metaphors by creating colorful bulletin board displays of each one. The bulletin boards were incorporated into the lessons so that children attended to them. Focal questions that students should ask themselves about each strategy were included on the bulletin boards. These served as daily reminders to use the strategies and to think about them. The motives of the metaphors, such as detectives or planning a trip, were also incorporated into worksheets so that strategies became tangible, sensible, and functional.

Our third technique involved group discussion. We believe that teachers and students do not have adequate opportunities to talk about the strategies and skills that they are learning. Students need opportunities to express confusion, distress, or pride publicly and they need to know that they are not alone. Other students can have similar thoughts and feelings. There are personal and idiosyncratic aspects to reading strategies just as there are personalized aspects of comprehension and appreciation, that can be shared noncompetitively because there is not always a "best" strategy. We found that group discussions provided an outlet for readers of all abilities that was satisfying and informative. Talking also seemed to promote cooperative learning and to break down the boundaries created by reading groups.

It takes some teachers time to get used to so much discussion in the classroom but we have found that dialogues inject spirited enthusiasm into what is ordinarily dull drill-skill practice. We hasten to add that the quality of teacher talk during these dialogues is critical. Duffy, Roehler, Book, Meloth, and Vavrus (1984) found that effective teachers emphasize: (1) assistance during reading rather than

procedure or assessment, (2) "knowing how you know," (3) conscious connections to previous and future learning, (4) the context to which new skills will be applied, (5) making invisible cognitive skills tangible, and (6) responding to student confusion with advice about how to think strategically. Obviously the quality and content of the group dialogues must match the information in the informed instruction and students' levels of understanding.

Our fourth method involves guided practice. As part of each ISL lesson students read a selection and apply the strategy that they are learning. Immediately after reading, the group discusses the strategy--how it worked, the effort required, and students' evaluations of its usefulness. Worksheets built around each metaphor were also provided so that students could read and use the strategies individually. We found that teachers frequently used the metaphors to refer to students' performance, e.g., "you didn't follow your reading map" or "you forgot to use the clues." Here we can see how the metaphors for strategies promote communication about cognitive processes and how teaching resembles cognitive coaching.

Our final technique was to fade explicit support in the instruction and worksheets so that students had increasing demands to recruit and apply the strategies independently. We tried to teach generalization of the strategies to content area reading by including a "Bridging lesson" periodically. In this lesson, teachers used reading selections from science, social studies, etc. to reinforce the instructed strategy. In this manner students could learn directly that the strategies should be applied beyond "reading instruction."

The ISL program of reading instruction currently includes 20 modules designed for Grades 3, 4, and 5. Each module is designed to be used by teachers independently but we have worked closely with more than 60 teachers who have used ISL. Each module emphasizes one comprehension strategy and includes three separate half-hour lessons, the last one is always a bridging lesson. The standard format is as follows:

Topic Metaphor

Strategy Description

Rationale

Goals

Bulletin Board

Lesson A

Lesson B

Lesson C

Stories/Passages

Worksheets

There are approximately 20 typed pages of material for each module with stories and worksheets ready for thermofax or photocopying. The lessons provide detailed information about strategies, metaphors, and how to foster group discussions of them.

The set of 20 modules is arranged into groups of five as follows:

1-5 Planning for Reading

6-10 Identifying Meaning

11-15 Reasoning while Reading

16-20 Monitoring Comprehension

The entire list of modules, with metaphors and strategies listed separately, is shown in Table 1.

Insert Table 1 about here

While the methodology for instruction remained roughly the same each week, the content varied, with each week building on previously learned information. We focused our training program on building metacognitive awareness in the belief that such awareness, in itself, might promote better comprehension in young readers. Our goals were to make children aware of the requirements of skilled reading, to teach some strategies to effect good comprehension, and to promote the belief that these strategies are useful and worth employing.

Consequences of ISL

In our research during the past five years with more than 2000 students we have documented the advantages of teaching children about comprehension strategies. ISL has significantly increased students' awareness about comprehension strategies and we have shown that students who are most cognizant of strategies score highest on several tests of reading comprehension (Paris & Jacobs, in press). We have also shown that direct classroom instruction is relatively easy to implement and that brief group lessons can significantly increase children's use of cloze and error detection strategies (Paris, Cross, & Lipson, in press). Informal evidence also suggests that increased strategy awareness may enhance students' confidence and motivation for reading.

We believe that ISL combines cognitive skill and motivational will in students because the program emphasizes the functional value of strategic reading. Students who understand what they are learning and who appreciate the value of the extra effort required to use cognitive

strategies may be more motivated for three reasons. First, the strategies have become personally significant as sensible, valuable actions that are applied intentionally and selectively at the reader's discretion. They are therefore personalized means to chosen goals. Second, there is a rationale provided for the strategies because they have utility and economy -- using them results in better comprehension and savings of time in rereading or relearning. Third, the strategies are self-controlled and can be managed by students as personal resources. Failures can be attributed to strategy choice or inefficiency rather than inability, and success in reading can be promoted by effective use of strategies. These functional features of students' learning seem a natural reflection of pragmatic instruction. We believe that reading comprehension can be facilitated by emphasizing the principles and techniques embodied in ISL. The challenge is to inform students about cognitive strategies so that they perceive them as useful aids to reading. There are many methods and materials that can be developed for this purpose and the initial success of ISL should encourage our efforts.

IV. The Effects of Instruction on Reading Awareness

Awareness about reading has become an area of increasing interest in recent years because it distinguishes beginning and advanced readers, (Brown, Armbruster, & Baker, 1984; Myers & Paris, 1978). Skilled readers often engage in deliberate activities that require planful thinking, flexible strategies, and periodic self-monitoring. They do such things as predict what happens next in the story, look forward and backward in the passage, and check their own understanding as they read. Beginning and poor readers do not seem to recruit and use these skills (Baker & Brown, 1984; Ryan, 1981; Wagoner, 1983).

Current knowledge about children's reading awareness has come largely from interviews with children. Reid (1966) found that four and five year olds did not know the goals of reading or the function of letters, words, or punctuation. Johns (1980) observed a similar lack of knowledge among beginning readers. Myers and Paris (1978) found that older children were more aware than younger children of the effects of person, task, and strategy variables on reading and the utility of various strategies for comprehension.

Interview studies have also supported the importance of awareness for the acquisition of a variety of comprehension skills by attempting to explore the relation between reading awareness and reading performance. Canney and Winograd (1979) studied children's beliefs about reading by using an interview and an experimental manipulation. Children aged 8-14 were presented with passages that were either intact or disrupted. When children were asked if each passage could be read and why, it was found that younger and poorer readers attended to the decoding aspects of reading, but more proficient readers knew that

making sense of the text was the goal of reading. Forrest and Waller (1979) found that older, better readers were able to verbalize more about their strategic knowledge and were better able to utilize that information while reading. Paris and Myers (1981) compared good and poor readers matched for age, sex, and arithmetic achievement and observed that good readers knew more about reading strategies, detected errors more often while reading, and had better recall of text information.

Despite mounting interview and laboratory evidence and repeated assertions about the importance of metacognition or awareness for the acquisition of reading comprehension skills, there are few studies that have explored reading awareness in a typical classroom setting over the course of a school year. In this section we will discuss the construction of a measure of reading awareness, and attempt to answer two major questions: (1) Can reading awareness skills be taught in a classroom reading program? and (2) Who benefits most from metacognitive instruction?

Method

Subjects

The subjects were 783 third and 801 fifth graders drawn from two school districts in Southeastern Michigan. All children were members of intact classrooms whose teachers volunteered to participate in this study. Classes assigned to the control condition received no extra instruction beyond their normal reading activities. Teachers assigned to the instructional intervention condition taught ISL lessons each week in addition to their regular reading activities.

Measures

Because this section is restricted to the issue of the effects of instruction on reading awareness, only two relevant measures will be discussed. A multiple-choice reading awareness index was constructed to provide data about children's reading awareness and and will be described in detail. The Gates-MacGinitie comprehension subtest, a standardized comprehension test, was used to assess the reading level of each child.

Reading Awareness Index. An instrument was developed to measure reading awareness that met four goals. The first was that it be easy to administer. We wanted a measure that could be group-administered in a limited amount of time. The second goal was to develop an instrument that is reliable over time so that it could be used before and after the instructional intervention. The third goal was to develop an instrument based on our conceptual framework about reading awareness that still reflected children's ideas about reading. We did not want to lose all of the valuable information gained from previous interviews with children. The final goal was to construct a measure that could be used for different ages, so that developmental changes in awareness could be described.

An earlier, extensive interview study served as the basis for the new awareness measure. It contained questions about children's awareness of the evaluation, planning, and regulation skills involved in reading. In the previous study, more than 200 children were individually interviewed in an open-ended script format. The open-ended responses were then assigned to categories and scored for awareness of how, when, and why to use strategies and children's understanding of the goals of

reading. The interview used in that study yielded a total score based on 15 items, five questions each about evaluation, planning, and regulation. (For more details about the open-ended interview and the results of that study, see Paris & Jacobs, in press).

In order to develop a measure that was easy to administer to a group and easy for the children to complete, a multiple choice format was selected. The three sets of evaluation, planning, and regulation items from the earlier study were retained, using the coding categories and response frequencies to develop choices for the new format. This method assured that the choices reflected children's actual answers to the same questions. A fourth set of questions was developed and added at this point to tap conditional strategies used to reach specific goals (i.e., writing a book report). The result was an index of reading awareness containing 20 questions (four sets of five) that measured many different facets of reading, including evaluation of one's self and the task; planning ahead; monitoring one's own progress; and the use of strategies to reach specific goals. Below is an example of one of the multiple-choice items:

What is the hardest part about reading for you?

a. Sounding out the hard words.

b. When you don't understand the story.

c. Nothing is hard about reading for you.

Each question was followed by three choices, worth 0, 1, or 2 points. The order of the choices was random. Responses were selected from those given to the same questions in each category during the open-ended interview. Responses in the zero category were inappropriate or denied the problem. Responses in the one point category were adequate

responses based on decoding, external features of the text, or vague references to affective or cognitive ideas, but no mention of a specific strategy. Choices receiving two points were good responses that were evaluative, planful, or showed awareness of goals and strategies. An example of the scoring for one item illustrates the scoring.

If you are reading for science or social studies, what would you do to remember the information?

score	
2	a. Ask yourself questions about the important ideas.
0	b. Skip the parts you don't understand.
1	c. Concentrate and try hard to remember.

In this example, "b" received zero points because it is an inappropriate response to the goal of remembering science or social studies information. In some situations it may be a reasonable strategy for getting through the material, but not in this case. The answer labeled "c" received one point because it describes a general cognitive act which indicates an understanding that some extra effort and special thinking will be required to remember the social studies or science material. However, no specific strategy for the goal is mentioned. In this example, choice "a" received two points because it specifies an active self-questioning strategy that will allow the child to monitor retention of the material. Scores for the twenty questions on the multiple-choice index were combined to produce a total score of 0-40 points for each child.

In order to check the test-retest reliability of the multiple-choice measure, pretest and posttest scores for the control group

(N=544) were correlated. The control group provided a comparison of average awareness changes to be expected during the school year for children not receiving ISL instruction. After an eight month interval, the correlation was $r=.55$, $p<.001$. To make sure that the measure was appropriate for both third and fifth graders, all items were analyzed separately. No ceiling or floor effects were found and no items were unusually skewed. The standard deviation for items ranged between .49-.89.

Standardized comprehension test. The comprehension subtest of the Gates-MacGinitie Reading Test (MacGinitie, 1978) was used to measure reading level because it is a group-administered, normatively referenced test that provides raw, percentile, and extended scale scores. The comprehension subtest measures children's abilities to answer questions about text information they have read. Equivalent forms of the test were used for each grade (Level C for third graders and Level D for fifth graders). Form 1 was used for the pretest and Form 2 was used for the posttest at each grade level. The pretest extended scale scores were used to divide children in each grade into three reading levels. Low, medium, and high reader groups were formed by partitioning subjects at the 33rd and 67th percentiles of the national norms. This resulted in a similar distribution of reader groups at both grades.

Procedure

Testing. The two tasks were administered to intact classes in conjunction with other tests in the larger reading project. The pretests were administered during October during two one-hour sessions by trained experimenters. Posttests on the same tasks were administered in April and May of the school year. Experimenters instructed children

to circle the "best answer for you" on the reading awareness index. Children proceeded through the task at the same rate, with the experimenter reading each question and each choice aloud to ensure that all children were able to understand the questions. The experimenter paused until all children had selected an answer before going on to the next question. Questions and choices were repeated when necessary. The Gates-MacGinitie comprehension subtest is a timed test. Experimenters read the instructions to the children and gave no additional help during the test.

Results

The experimental design of this study permits an evaluation of the effectiveness of the instructional program on children's reading awareness by comparing pretest and posttest scores for experimental and control groups. The first section includes analyses that show how the intervention enhanced children's awareness scores. The second section describes the impact on children at different reading levels. The analyses presented answer the questions: Did classroom instruction improve reading awareness? and Do children with different levels of knowledge about reading benefit equally from instruction about reading strategies?

The Effects of Classroom Instruction

The 20-item reading awareness measure provided a 40 point scale of reading awareness that is the main index of children's knowledge about reading in all analyses described here. Reading awareness scores ranged from 12 to 39, with a mean of 22.99 for third graders and 26.92 for fifth graders. The impact of the instructional intervention on children's reading awareness was assessed by conducting a 2 (grade) x 2

(treatment) analysis of covariance, using the pretest awareness scores as covariates. This analysis revealed that children in the experimental group received significantly higher scores than their control counterparts after a year of metacognitive instruction, $F=93.43$, $p<.00001$. Fifth graders also scored significantly higher than third graders on the reading awareness index, $F=25.46$, $p<.00001$. However, no interaction between treatment and grade was found, indicating that the instruction was not dependent on grade, but was equally successful for children in both grades. Figure 1 illustrates the impact of the

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Insert Figure 1 about here

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instruction on third graders' reading awareness. Although all children in grade three increased their reading awareness during the school year, the gains made by the experimental group were clearly larger. The two groups showed nearly equivalent reading awareness at the beginning of the year, starting within one point of each other, but by the end of the instructional period the gap had widened to nearly three points.

Figure 2 illustrates a similar pattern of gains in the fifth grade.

Insert Figure 2 about here

Although the slopes are slightly less dramatic, the fifth graders participating in the instructional program gained significantly more than the children in the control classes. Comparison of Figures 1 and 2 points out the overall difference between third and fifth graders' scores. Fifth graders scored about an average of three points higher than third graders in both groups.

Instructional Impact on Children at Different Reading Levels

Children were divided into low, medium, and high reader groups by using the pretest scores on the Gates-MacGinitie comprehension subtest. In order to test the differential impact that instruction may have had on children reading at different levels, a 2(grade) x 2(treatment) x 3(reader) ANCOVA was performed, using the pretest awareness scores as a covariates. This analysis yielded a highly significant main effect for reader, $F=44.27$, $p<.00001$, indicating that good readers are more aware of important reading variables than poor readers are less aware. The same large effects for grade and treatment reported earlier were again found. A significant interaction between reader and treatment would support the hypothesis that one group of readers received greater benefits from the instruction than another group. However, no interaction was found using this procedure, which means that readers at all levels benefited from the ISL program.

Posttest scores for third graders at each reading level are

Insert Figure 3 about here

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illustrated in Figure 3. The positive relation between reading ability and reading awareness are pictured very clearly. The graph also shows that after receiving the instruction, children at each reading level demonstrated more awareness than children in the control group. Figure 4 depicts the same pattern for the fifth grade, showing that instruction improved performance at all levels.

Insert Figure 4 about here

Discussion

This study was designed to investigate the effects of classroom instruction on reading awareness. In order to study the effects of instruction, a measure of awareness was needed. The construction of the measure we developed for that purpose was described in detail. The data presented here provide convincing evidence that a classroom-based program of direct instruction can improve children's awareness and understanding of reading strategies. We also found that fifth graders exhibited greater reading awareness than third graders. Most striking, however, was the finding that children at all reading levels and in both grades benefited from an instructional program. The effect was not limited to a particular subgroup of children.

It is evident from this study that explicit instruction about the evaluation, planning, and regulation of reading can significantly increase children's reported knowledge of those skills. The fact that the information in the instruction was understood is particularly noteworthy because it was communicated by a number of different teachers, using their own styles in varied classroom settings. Although that is important, the challenge is just beginning as we look at the dynamics of individual classrooms in an effort to discover the variables that might mediate increased awareness. We are beginning to look at teacher factors, such as interest and enthusiasm for the program, time spent on lessons, and beliefs about reading. The direct applications for a program such as this are clear. If teachers supplement their lessons on reading by explicitly teaching about the how, when, and why of strategic reading, children's reading awareness and comprehension may improve.

V. Improving Literal and Inferential Comprehension with ISL

Early reading instruction helps children learn to identify main ideas, to attend to important story details, to make inferences, to connect ideas from different parts of stories, and to apply their prior knowledge. Yet a substantial number of children in elementary schools do not learn to read well. There are several possible reasons why children fail to become proficient readers, including a poor understanding of the goals of reading, and ignorance about the existence of reading strategies or the value of these strategies. All of these shortcomings can be viewed as metacognitive deficits.

In order to assess the effect of ISL on children's comprehension, two different instruments were used. The first of these was the cloze task (McKenna & Robinson, 1980). The cloze task is a procedure where words are deleted from a passage according to some specific rule, and then students are expected to fill in the blanks with the original words. The task requires the generation and testing of hypotheses about the semantic and syntactic appropriateness of various alternatives, based upon the reader's understanding of the passage meaning. As a measure of reading comprehension, the cloze task has been found to assess readers' abilities in literal comprehension, comprehension of the main idea, inferential comprehension, and structural awareness. In our study each child read one grade-appropriate passage which had every fifth word deleted from the text, for a total of thirteen blanks. The children's cloze score could range from zero to thirteen, depending upon the number of correct responses.

The second comprehension task was an error detection task. Part of skilled reading is the ability to judge one's understanding while

reading. Does the information make sense? Does it follow logically from previous material? Monitoring comprehension in this way involves reflecting on one's understanding, realizing when it is incomplete or erroneous, and then making and implementing plans for improving comprehension. An excellent measure for determining if children monitor their comprehension is to judge if they are aware of faulty comprehension. To this end we designed grade-appropriate passages that included some scrambled phrases and incongruous sentences. The ability of children to detect this anomalous information was a measure of their comprehension monitoring. The children read two stories, each of which contained three syntactic errors and three semantic errors. They were credited with a "Hit" if they underlined a portion of the text that contained an error, and they were scored for a false alarm if they underlined an acceptable portion of the text. The number of hits and false alarms were combined to form an error detection efficiency score. The value of this score could range from negative one to positive one, with a small value indicating poor comprehension monitoring and a large value indicating efficient comprehension monitoring.

The goal of our analyses was to determine if the ISL program improved the children's comprehension more than customary reading instruction in control classrooms. We also investigated the effect of two individual variables: Reading Level and Sex. Three reading level groups were formed on the basis of children's Gates-MacGinitie scores. The 33rd and 67th percentiles derived from the norm reference group were used as cutoff points.

Our analyses showed that boys and girls did not differ in the gains they made during the school year. In addition, there were no

interactions between Treatment, Reading Level, and Sex. However, on both the cloze and error detection tasks, there were significant effects due to Treatment and Reading Level, as shown in the following figures.

Insert Figure 5 Here

Figure 5 shows cloze task gain scores for the third grade sample. Each pair of bars represents the average gain scores for a different reading level, with the striped bars corresponding to the Experimental Group and the solid bars corresponding to the Control Group. Poorer readers made larger gains than did the better readers, and within the Low and Medium Reading Level groups, the Experimental children made greater gains than did the Control children.

Insert Figure 6 Here

Figure 6 shows similar results for the fifth grade sample. In this case, however, the better readers made greater gains than the poorer readers, and the experimental groups outgained the control groups at all three reading levels.

Insert Figure 7 Here

Figure 7 shows gain scores on the error detection task for the third grade sample. Again, each pair of bars represents average gain scores for a different reading level, with the striped bars corresponding to the Experimental group and the solid bars corresponding to the Control group. Poorer readers made greater gains than better

readers, and the Experimental children made greater gains than did the Control children.

Insert Figure 8 Here

Figure 8 shows similar data for the fifth grade sample. In the fifth grade, better readers tended to make greater gains than the poorer readers. In this case the treatment effect is restricted to the low reading level group.

To summarize, these results show that the ISL instructional program improved elementary school children's strategic reading as measured by the cloze task and the error detection task. These findings replicate the findings from our earlier study (Paris, Lipson, & Cross, in press), where we also found that the experimental children improved more than the children in control classrooms. The current research also extend the earlier findings because in this case the children's teachers delivered the instruction themselves.

Our next step in analyzing these data is to investigate the influence that teacher characteristics might have on children's learning of reading skills. For example, we are investigating the possibility that teachers who were most enthusiastic about the instructional program were primarily responsible for the program's effectiveness. These analyses address central issues of generalizability and implementation. We will also be using these data to illustrate the methodological issues involved in evaluating a field-based project such as ours. These issues include the proper unit of analysis, the appropriate model for assessing gains, and power of the statistical analysis.

VI. The Relation between Childrens' Attitudes and Reading Performance

Past studies have shown that children's attitudes about their own abilities and progress can have a direct influence on how they learn to read. Positive attitudes are thought to facilitate positive motivation, which in turn facilitates achievement. Although the relationship between motivation and achievement has been well documented in the literature, few studies have examined the strength and nature of this relationship with respect to age and sex. And even fewer studies have examined differences in the types of attitudes that children have about their learning experiences. For instance, children's attitudes can be thought of in global terms (such as attitudes about life) or they can be broken down into more specific areas -- such as attitudes about school, attitudes about reading and attitudes about the self. In the present investigation we were concerned with how children's specific attitudes related to their own reading performance.

We examined several types of attitudes. We assessed children's motivation for schooling and their sense of control over things that happen to them in school, as well as children's attitudes about reading. We were interested in how these attitudes would differ depending on the child's age (third grade vs. fifth grade), the child's sex (male vs. female) and the treatment group that the child was in (experimental vs. control).

The data in this section is based on a subsample of 500 children who were given a school attitude questionnaire in addition to other posttest measures used in this study. The School Attitude Questionnaire is a survey used to assess the students' affective responses to their

school experience. The school attitude measure contained several scales. We administered two of these scales: The Motivation for Schooling Scale and the Sense of Control over Performance Scale. Each scale contained fifteen items. Students were asked to respond to each item by indicating whether they always agreed, usually agreed, sometimes agreed, or never agreed with the statement in question. Responses were coded in a positive direction so that a student received one point for checking never agreed, and four points for checking always agreed. In some cases, due to negative wording, the reverse of this coding was required. Scores on each scale ranged from 15 points to 60 points.

The Motivation for Schooling Scale consisted of 15 items designed to examine the effect of students' reactions to past school experiences upon their motivation in school. Items on this scale focused on the students' willingness to participate in current school experiences, their desires to perform competently in the future and their perceptions of the relation between current schooling and future needs. An example is, "I get excited about school and look forward to it everyday." Students could choose one of four responses to indicate their agreement; Always true, Usually true, Somewhat true, or Never True.

The means obtained from the motivation for schooling scale are shown in Figure 9. The third grade means for females and males

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Insert Figure 9 about here

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are presented on the left side of the scale: the means for the fifth grade females and males are presented on the right side. The bars with the stripes represent the experimental groups and the solid bars represent the control groups. This figure illustrates the significant

treatment X grade X sex interaction found in a three way analysis of variance. For both grades, females scored higher than males, which indicated that those females in our sample were more motivated by school than the males. This was especially true for the fifth grade females.

The next set of attitudes that we examined were students' perceptions about the amount of control they had over their performance. The sense of control scale, taken from the School Attitude Measure, contained items that focused on students' feelings about their abilities to exercise control over situations that affect them at school. An example is; "I am the one who makes improvements in things at school." Students could again register their agreement according to four response options. This 15 item scale also contained statements about the students' willingness to take responsibility for pertinent school outcomes. Scores on this scale ranged from 15 to 60 points.

A two way analysis of variance on the sense of control scale revealed significant treatment X grade effects. As Figure 10 indicates,

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Insert Figure 10 about here

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the experimental group of children scored higher than the control group. This was especially true for the third grade experimental group as shown in Figure 11. Among fifth graders, there were no significant differences between experimental and control groups. However, fifth graders tended to score higher on the sense of control scale than the third graders. There was also a significant grade X treatment X sex interaction. In every group except the fifth grade females,

Insert Figure 11 about here

The experimental groups of children scored higher on the sense of control scale than the control group. This figure also shows that females had a higher sense of control over performance than males.

We also measured children's attitudes toward reading on a 10-item scale in which children expressed their agreement with statements such as, "I really enjoy reading." Scores on the five point ratings were summed across the ten items so that high scores indicate more positive attitudes. Figure 12 illustrates these data at the posttest.

Insert Figure 12 about here

A two way ANOVA revealed a significant treatment X grade effect. The third grade experimental children were more positive about reading than any other group.

We also analyzed the data to see if there were any differences in reading attitudes due to the sex of the child. As shown in Figure 13,

Insert Figure 13 about here

girls had more positive reading attitudes than boys in both grades. In fact, on all of the attitude measures, females tended to score higher than males. Females felt more motivated by their school experiences, more in control over their performance, and were more positive about reading.

We were also interested in finding out which type of attitudes would best predict reading performance as measured by the Gates-

MacGinitie Comprehension Test, a standardized test of reading comprehension. We performed a multiple regression using the motivation for schooling scale, sense of control over performance scale, and reading attitude measure as our independent variables. We analyzed the data by looking at grade and treatment and found a similar pattern for all groups except the fifth grade control group. For both third grade groups, experimental and control, as well as the fifth grade experimental group, reading performance was significantly predicted by scores on the reading attitude measure and the sense of control scale.

When we examined these measures in terms of the amount of variance accounted for, we found that for the third grade experimental group, the attitudes about reading measure accounted for 28% of the variance, while sense of control attitudes accounted for 7% of the variance. Among the third grade control group, this finding was reversed. The sense of control scale accounted for 24% of the variance, while the attitudes about reading measure accounted for only 4%.

In the fifth grade experimental group, attitudes about reading accounted for 15.0% of the variance and the sense of control scale accounted for 3%. For the fifth grade control group, only the attitudes about reading measure predicted their performance on the Gates-MacGinitie, and this scale accounted for 16% of the variance. Thus, it appears that reading performance can be predicted by understanding children's attitudes about reading. Global measures of school attitudes did not predict performance as well as specific measures.

VII. Perceived Competence and Reading Achievement

Schoolwork for many children can be either a positive and rewarding activity, or an unpleasant and tedious one. Consider the following thoughts and feelings that may accompany this experience:

"Some people feel that they are very good at income tax returns, but other people worry about whether they can do what is required of them."

"Some people know when they have made mistakes without checking with an accountant, but other people need to check with an accountant to know if they have made a mistake."

"Some people are pretty slow in finishing their income taxes, but other people can do their tax returns quickly."

Thoughts and feelings such as these have been recently studied with regard to children's motivation and achievement in school. These thoughts and feelings have collectively been referred to as children's perceived competence. Susan Harter, who popularized this term, found that children's perceptions of their own abilities increasingly correlated with their achievement as they advanced in school. Prior to the second grade, children's self-evaluations have been reported to err in a positive direction. That is, young children have been reported to exaggerate their skills uniformly. Harter also reported that measures of intrinsic motivation were correlated with self-perceptions. Children who held high perceptions of self-competence were more likely to be intrinsically motivated toward school than children with low levels of perceived competence. The consideration of motivational factors in conjunction with metacognitive variables should lead to a more complete understanding of children's achievement behavior.

The study had three goals. The first goal was to determine whether the intervention which was designed to increase children's reading awareness and reading comprehension also improved children's self-perceptions and intrinsic motivation. To the extent that the provision of strategies and conditional knowledge increased children's abilities to control their reading comprehension, gains might also be observed in their motivation to read and in their perceived competence.

The second goal was to identify how children at different developmental and reader skills levels performed on measures of perceived competence and motivation. Does reader skill have an effect on how children perceive their abilities and on their level of intrinsic motivation? What changes occur in perceived competence and intrinsic motivation with age and experience?

The third goal was concerned with exploring the interrelationship between cognitive and motivational variables in explaining reading achievement. Cognitive variables such as reading strategies and motivational variables such as self-perceptions have been of interest to researchers, but in the past each of these influences has been studied independently. That is, prior studies have examined separately the relationship between reading comprehension and a given cognitive or motivational component. It has been increasingly apparent that the meaning of demonstrated differences between good and poor readers on discrete factors must be considered in the context of other skills and abilities.

We used a multivariate approach and a battery of tasks to assess reading achievement, perceived competence, and motivation. The primary question is: How are these cognitive and motivational variables

independently and together related to reading comprehension for readers of different developmental levels as well as readers of different skill levels?

Method

The battery of tests used in this section consisted of six measures that assessed achievement in reading, self-perceptions, and motivation. These tasks were the Gates-MacGinitie test that measured reading comprehension; a cloze task that assessed reading strategies; the Index of Reading Awareness that assessed metacognition about reading; and the reading attitudes measure. Two additional measures were included in this study: Harter's Perceived Competence Scale for Children, that measured self-perceptions, and the Intrinsic versus Extrinsic Orientation Scale, that measured motivation. These scales were selected because of their lower susceptibility to response bias and their high reliability and validity.

Harter's scales have identical formats that provide brief descriptions of two types of children. Here is an example:

> Some kids feel that they are very good at their schoolwork, BUT other kids worry about whether they can do the work assigned to them.

These contrasting descriptions were presented as being equally likely and the children were first instructed to pick the child most like them. The second step involved deciding whether the statement was either really true or sort of true for them and marking the appropriately labeled box. This resulted in a score between 1 and 4 for each of the subscales with a high score representing high perceived self-competence or high intrinsic motivation.

Children's self-perceptions were assessed with two subscales from the Perceived Competence Scale. The Cognitive subscale measured children's views of their academic abilities. The Social subscale assessed children's views of their social skills and popularity.

Three subscales from A Scale of Intrinsic versus Extrinsic Orientation were used to assess motivation. The Mastery orientation scale assessed independent mastery behaviors versus dependence on the teacher for completing schoolwork. The Curiosity subscale was concerned with whether students do academic tasks out of an intrinsic interest and curiosity, or in order to please the teacher. The Criteria subscale measured children's knowledge about the norms and rules governing performance in school.

The children were divided into three reader groups based on the Gates-MacGinitie Comprehension Test. As you recall, the Gates-MacGinitie is a standardized measure of children's understanding of prose passages. The measure yields an Extended Scale Score that is a continuous interval scale that indexes reading ability over a broad age range. Low, medium, and high reader groups were formed by partitioning subjects at the 33rd and 67th percentiles of the national norms.

The first goal was concerned with the effects of the intervention and whether improvements in children's awareness were also accompanied by improvements in children's self-perceptions and motivation. No significant differences were found between the experimental and control children at either grade level on the five subscales of perceived competence and motivation. The experimental and control children saw themselves as equally competent in academic and social domains. Furthermore, the experimental and control children performed at

comparable levels on measures of mastery motivation, curiosity, and knowledge of criteria.

These findings show that gains in children's self-perceptions and motivation did not accompany improvements in reading awareness and reading skills. To the extent that the intervention fostered a greater sense of control and awareness over reading processes, an enhancement of self-perceptions and motivation would have been expected. On the other hand, the absence of self-perception and motivational gains confirms that the observed increases in reading comprehension were not attributable to indirect increases in enthusiasm or interest in reading. Rather, these findings provide evidence that the gains in reading resulted from the corresponding improvement in reading awareness and strategy use.

The second goal was to identify how children at different developmental and reader skill levels performed on measures of perceived competence and motivation. A Multivariate Analysis of Variance revealed a significant main effect for reader skill level. Posttest comparison revealed significant differences between Low and High readers on all measures of self-perceptions and motivation, with the exception of the social subscale. Differences between Medium readers and the remaining groups were also significant in many cases, but not on all measures. With regard to developmental differences, age-related changes were found on the social subscale and the knowledge criteria scale.

The following figures will present the data for the subscales assessing self-perceptions and motivation. Each figure will present the mean score for third and fifth graders by reader level. Figure 14 shows

Insert Figure 14 about here

the results for the cognitive subscale which assesses children's views of their academic abilities. At both third and fifth grades, these findings show a pattern of perceived cognitive competence that parallels children's actual abilities. Children in the Low and Medium reader groups saw themselves as significantly less competent in the cognitive domain than readers in the High group.

Figure 15 presents the findings for the social subscale.

Insert Figure 15 about here

Children of different reader skill levels viewed their social skills and popularity at equivalent levels. This suggests that children do differentiate between academic and social competence and, that children who achieve at low levels academically do not necessarily have generalized negative views of themselves. The data do show a developmental difference, indicating that older children have more positive views of their social competence than do younger children.

The next three figures present the results for the motivational subscales. Figure 16 shows the results for the Mastery subscale.

Insert Figures 16, 17, and 18 about here

Low reader groups at both grades are characterized by a lower level of mastery motivation than High reader groups. The Low readers are more likely to seek help from the teacher than to complete tasks

independently. Third and fifth graders displayed a comparable level of mastery orientation.

Figure 17 displays the findings for the Curiosity subscale. Although there are no apparent grade differences, Low readers are characterized by less curiosity and intrinsic interest in academic tasks than High readers. Finally, on the Knowledge of Criteria subscale (Figure 18), we see both developmental and reader differences in children's understanding of the norms and rules of the classroom. Children show a greater understanding of classroom structure with age and experience and with increasing reader ability.

The third goal was to examine the interrelationship between cognitive and motivational variables in explaining reading achievement. How do the cognitive variables of reading awareness and strategies, and the motivational and self-perceptions variables independently and together relate to reading comprehension? Furthermore, does the pattern of these relations differ for readers of different developmental levels as well as readers of different skill levels? To answer these questions, stepwise multiple regressions were performed to determine the variance in reading comprehension explained by these variables. The dependent variable was the Gates-MacGinitie comprehension subtest. The predictor variables were:

1)Cloze

2)Index of Reading Awareness

3)Reading Attitudes Measure

4)Cognitive and social subscales of self-perceptions

5)Mastery orientation, curiosity and knowledge of criteria subscales of motivation

The results for the third graders in Table 2 show the variables

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Insert Table 2 about here

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that explained a significant amount of variance in the Gates-MacGinitie test. The numbers labelled r^2 representing the percent variance accounted for have the decimal point moved over two places. Reading strategies, as measured by the cloze task, was the single best predictor of reading comprehension. Reading awareness and the motivational variables also accounted for a significant, although smaller part of the variance. Similar findings were also obtained for the fifth graders, presented in Figure 7. The pattern of predictors was identical the the third graders. These findings show that although

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Insert Table 3 about here

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strategic behaviors play an important role in reading comprehension, reading awareness and motivation account for a significant amount of the variance in comprehension over and above that of reading strategies.

Separate analyses were done to determine whether different patterns of the cognitive and motivational variables explained reading achievement. Past studies have shown that general analyses mask differences in the pattern of predictors for readers of different skill levels. Stepwise multiple regressions were performed separately for Low, Medium, and High reader groups at both grades. Table 4 presents the results for third grade Low, Medium,

Insert Table 4 about here

and High reader groups. The cloze task was the best predictor of reading comprehension for all readers but Medium readers. Reading awareness also emerged as a significant predictor. Among fifth graders, Table 5 shows that the cloze task is a

Insert Table 5 about here

secondary predictor at all reader levels, and the best predictor for Low readers is reading awareness; for Medium readers, Mastery orientation; and for High readers, Reading attitudes with Social and Cognitive self-perceptions also explaining additional variance in comprehension.

These findings indicate that strategic ability was important for third graders, but among older and better readers, motivational factors played a larger role. This suggests that for third graders and for less skilled readers, it matters less how motivated or aware they are, than how well they are able to use context as measured by the cloze task. Among good readers, this means that strategic ability alone is not enough to predict reading achievement. The better readers are distinguished by high levels of motivation and awareness and more positive attitudes toward reading.

In summary, these findings indicate that the relative importance of reading skills, reading attitudes, and motivational variables differs with age and experience as well as reader skill. Having a repertoire of reading strategies, the knowledge of how to use them appropriately, and

the motivation to pursue reading, jointly contribute to children's reading achievement.

VIII. The Use of Context as a Reading Strategy

Context refers to the information provided in a passage that both facilitates comprehension and constrains interpretation. This includes general information, such as the title of a passage, as well as the semantic constraints within and between sentences of a passage. Our discussion of context will focus on two issues. The first of these is the extent to which different groups of children will use a thematic title to facilitate comprehension of a passage. Previous research has established that titles serve to prime comprehension by allowing access to previous knowledge about a topic, thereby providing a basis for interpreting a passage (Bransford & Johnson, 1973; Dooling & Mullet, 1973). We want to extend that work in two ways: (1) by looking at the performance of different groups of children given versus not given a title, and (2) by examining what effects ISL has on children's performance. The second issue is the extent to which children use thematic information as opposed to sentential information in constructing meaning from sentences within passages.

A subsample of about 400 children was selected from the total sample of children in the two school systems. Approximately half were third graders and half were fifth graders, with each grade divided into experimental and control subjects. All of the children were given two multiple-choice cloze tasks. In these tasks, children were given passages from which nine words were deleted. In each of those spaces, three words were inserted from which children were to pick the one that fit the best. In each case, the alternatives were of three kinds: (1) the correct choice, which was semantically appropriate for the sentence and for the topic of the passage; (2) a word appropriate for the theme

or topic of the passage, but not semantically appropriate for the sentence, and (3) a word that was appropriate for the sentence, but which did not fit the theme of the passage. Each child was given two such passages, one about brushing teeth and the other about making toast. [1] For every child, one passage had a title that provided the topic of the passage. The other did not have a title. We constructed the passages so that they would by slightly ambiguous, although we inserted clues to the topics, so that, for example, the story about making toast mentioned key concepts such as morning, hunger, and taking pieces out of the bag. Thus, when not given a title, the children had to construct the theme of the passage using the clues provided.

To summarize, the children were given two multiple-choice cloze tasks, one with and one without a title. The alternatives for each of the nine slots in each story consisted of (1) the correct choice, (2) a thematically appropriate word, and (3) a sententially appropriate word. We were interested in how different groups of children performed in this task. The levels of each group were third and fifth graders, control and experimental subjects, and poor and good readers. The grade and treatment factors are self-explanatory, corresponding to the factors discussed in the other papers of this symposium. Poor and good readers were defined by separate median splits on the post-test Gates-MacGinitie comprehension scores for the third and fifth graders of this subsample. Thus, ability was defined relative to the other children of the subsample, and done separately for each grade.

We were interested in grade and reading ability as subject factors because we wanted to examine how context effects vary with age and skill. However, looking at task performance as a function of treatment

is slightly more critical in the present context. The instructional program focused on reading as a strategic behavior. Included in that focus were topics that emphasized thinking about a topic before reading, integrating information in text with one's existing knowledge, and connecting ideas within text. In essence, children were taught strategies that directly apply to the multiple-choice cloze task as it is used here. Thus, one might expect that the experimental subjects would perform better than control subjects in this task. Since children were given this task only during posttesting, it was possible to test that hypothesis in the present study, using a posttest only design.

The data were analyzed by separate ANOVAs on correct performance and errors. To facilitate the discussion of the results, I will report first the analysis on correct performance, and then the analysis of errors. For the analysis of correct responses, a 4-way ANOVA was performed on Grade, Treatment, Reader Ability, and Title, with repeated measures over the last factor. Grade of course refers to third and fifth graders. Treatment refers to control and experimental subjects. Reader ability refers to the groups formed by the median split on comprehension scores, and Title refers to performance given a title versus not given a title, and is a repeated measure since each child received two passages.

Each of the four main effects of this analysis was significant. These results are straightforward and very reliable ($ps<.001$). That is, fifth graders performed better than did third graders, good readers performed better than poor readers, and providing a title facilitated performance relative to not providing a title. Of perhaps more importance was the fact that experimental subjects performed better than

did control subjects, substantiating the argument that the instructional program had a significant impact on the reading ability of the experimental subjects. However, there were several significant interactions as well.

Figure 19 shows both the main effects of Grade, Reader Ability, and

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Insert Figure 19 about here

Title, and the nature of the interactions involving these factors. The Grade X Reader Ability 2-way interaction and the 2-way Grade X Reader Ability X Title were both significant (ps<.05). As the figure indicates, these interactions are mainly due to the near ceiling performance of fifth-grade good readers. Of greater importance is the interaction of Treatment and Reader Ability shown in Figure 20.

Insert Figure 20 about here

The difference between experimental and control subjects was greatest for poor readers (Experimental > Control, p<.001), suggesting that the treatment was of greater benefit to the poor readers than to the good readers. However, the possibility of ceiling effects is present in this interaction as well, so any interpretation must be taken with some caution. To summarize the results of the ANOVA, clear Grade, Reader Ability, and Title effects were found. Experimental subjects also performed better than control subjects, although the difference may be greater for poor readers than for good readers.[3]

A second ANOVA was performed on the error data. As mentioned previously, there were two types of distractors used in the multiple-

choice cloze tasks, thematic ones and sentential ones. For this analysis, error type was included as a within subjects factor, forming a 5-way, Grade X Treatment X Reader Ability X Title X Error Type ANOVA with repeated measures over the last two factors.

Because the number of errors is the complement to the number of correct responses, one would expect the same significant effects that were found in the previous analysis. That was what was found, with Grade, Treatment, Reader Ability, and Context main effects, all going in the expected direction. Similar interactions were found as well, including the Treatment X Reader Ability interaction, showing that control and experimental good readers did not differ as much as control and experimental poor readers.

What are of greater interest from this analysis are the interactions involving Error Type. If certain groups of children rely more on either thematic or sentential information in this task, one would expect that to be reflected in the relative amounts of each type of error made. In fact, groups of children did differ in type of errors made. Figure 21 shows a significant Treatment X Error Type interaction.

Insert Figure 21 about here

There was a tendency for control subjects to make more sentential errors than thematic errors. Experimental subjects showed the opposite tendency, with slightly more Thematic errors than sentential errors, although this difference was not significant ($p>.10$).

Figure 22 shows that Treatment and Error Type also interacted with

Insert Figure 22 about here

Reader Ability, such that the Treatment X Error Type interaction was found for poor readers ($p<.01$), but not for good readers ($p>.10$). However, there is a near floor effect for good readers, so it is unclear if the Treatment X Error Type interaction holds for good readers. The 4-way interaction of Grade, Reader Ability, Title, and Error Type was also significant ($p<.05$) but was in all likelihood due to floor effects. (Because that 4-way interaction does not include Treatment as a factor, it does not qualify any previously mentioned results.)

The results of the two analyses allow a number of points to be made about children's reading comprehension. First, like adults, children have problems in comprehension when they are not primed by a title. Access to prior knowledge is hindered, as is the construction of related ideas from text. The problems may lessen with reading ability, but they are still present in good readers. Second, and perhaps most importantly, the Informed Strategies for Learning program did facilitate performance on this task. Thus, it appears that the reading program did increase strategic reading behavior, such as the use of context for constructing meaning.

Young readers appear to base their interpretation and comprehension on information within sentences. That is apparent in the errors made by control subjects, who tended to choose sententially appropriate distractors more than thematically appropriate ones. This was more true for poor readers than for good readers. The experimental subjects did not show greater use of sentential information than thematic information. If anything, experimental subjects showed a tendency to

use thematic information more than sentential information (although not reliably so). This indicates that they were paying more attention to a passage as a whole than were control subjects, rather than just focusing on individual sentences. Although this is based on error data, indicating that their reading ability is less than perfect, this seems to indicate that they are becoming more strategic readers.

[1]These passages were adapted from Townsend (1977), and are available from the author.

[3]Although there were no differences in comprehension between experimental and control subjects before the treatment for the total sample from this project, it is possible that only taking a subsample for this research may have introduced some general ability differences between the 2 groups. To check on the possibility that that was the case, I ran a 3-way ANCOVA on Grade, Treatment, and Title, with pretest Gates-MacGinitie scores as the covariate. Although Slightly attenuated, reliable Grade, Treatment, and Title effects emerged, corroborating the previous results.

IX. Conclusions

The rich data from this project reveal that students in experimental classrooms gained greater knowledge and reading skills than their peers who did not receive ISL. Students of all ages and abilities improved their awareness about comprehension strategies and the variables that influence reading. In a similar fashion, ISL helped all children to use comprehension strategies better, as measured by cloze and error detection tasks. Thus, teaching children about comprehension strategies directly in the classroom can promote both metacognition and reading comprehension.

The experimental data corroborate the informal reports that we heard from teachers. They learned a great deal about comprehension and cognitive strategies and told us that they had changed their methods of teaching to allow more student discussion and expression. It is difficult to measure these effects on the teachers but we are encouraged that many of them will continue to use the materials and methods in their teaching. In sum, we believe that ISL was a successful experiment that contributes substantially to research on cognitive development and reading as well as providing a model of effective classroom instruction.

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Table 1. Comprehension Skill Training Modules

I. Awareness of Reading Goals, Plans, and Strategies

1. Goals and purposes of reading

"Hunting for reading treasure"

2. Evaluating the reading task

"Be a reading detective"

3. Comprehension strategies

"A bag full of tricks for reading"

4. Forming plans

"Planning to build meaning"

5. Review

II. Components of Meaning in Text

6. Kinds of meaning and text content

"Turn on the meaning"

7. Ambiguity and multiple meanings

"Hidden meaning"

8. Temporal and causal sequences

"Links in the chain of events"

9. Clues to meaning

"Tracking down the main idea"

10. Review

III. Constructive Comprehension Skills

11. Making inferences

"Weaving ideas"

12. Preview and review of goals and task

"Surveying the land of reading"

Table 1 (continued)

13. Integrating ideas and using context

"Bridges to meaning"

14. Critical reading

"Judge your reading"

15. Review

IV. Strategies for Monitoring and Improving Comprehension

16. Comprehension monitoring

"Signs for reading"

17. Detecting comprehension failures

"Road to reading disaster"

18. Self-correction

"Road repair"

19. Text schemas and summaries

"Round up your ideas"

20. Review

"Plan your reading trip"

Table 2. Multiple Regression on Gates-MacGinitie--Grade 3

	r^2	Increase in r^2
Cloze	.393	-
Attitudes	.431	.038
Awareness	.457	.026
Curiosity	.461	.004
Social	.465	.004

Table 3. Multiple Regression on Gates-MacGinitie--Grade 5

	r^2	Increase in r^2
Cloze	.320	-
Attitudes	.380	.060
Interview	.422	.042
Cognitive	.435	.013
Social	.439	.004
Criteria	.443	.004

Table 4. Multiple Regression on Gates-MacGinitie--Grade 3

Reader		r^2	Increase in r^2
Low	Cloze	.095	-
Med	Cloze	.134	-
	Awareness	.159	.025
High	Cloze	.111	-
	Attitudes	.140	.029

Table 5. Multiple Regression on Gates-MacGinitie--Grade 5

Reader		r^2	Increase in r^2
Low	Awareness	.073	-
	Cloze	.110	.037
Med	Mastery	.062	-
	Cloze	.110	.048
High	Attitudes	.070	-
	Cloze	.105	.035
	Social	.128	.023
	Cognitive	.167	.039

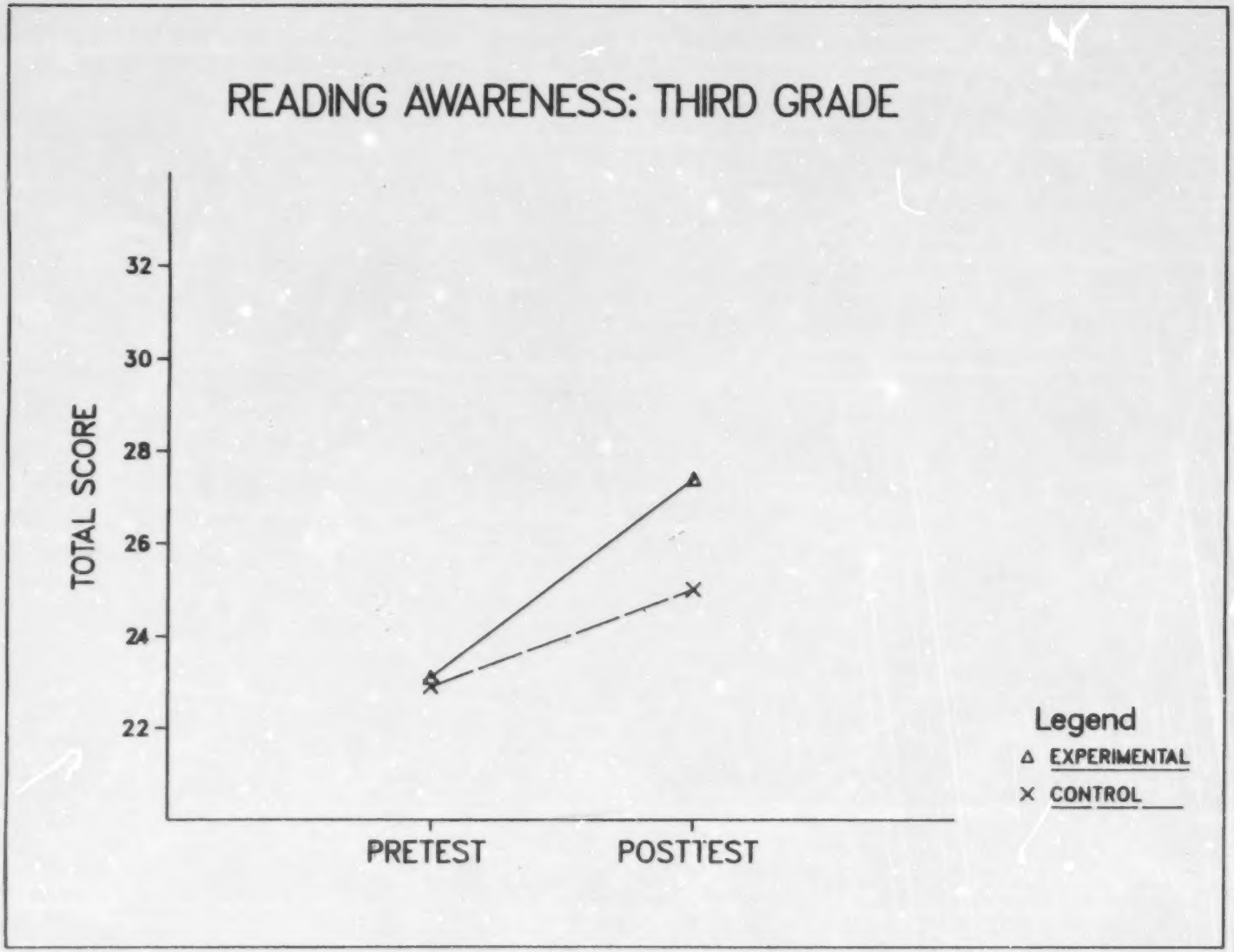

Figure 1. Longitudinal change in reading awareness for the third grade.

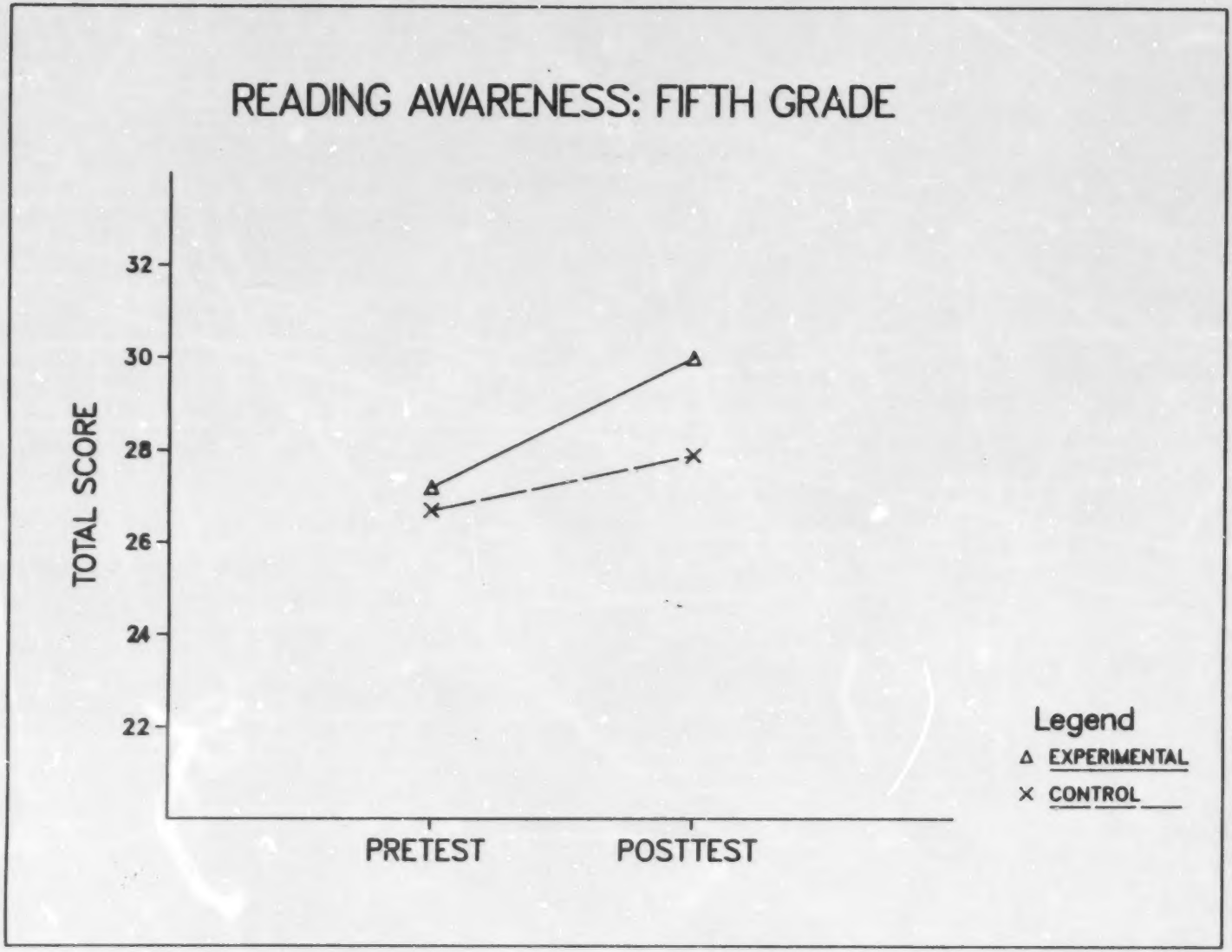

Figure 2. Longitudinal change in reading awareness for the fifth grade.

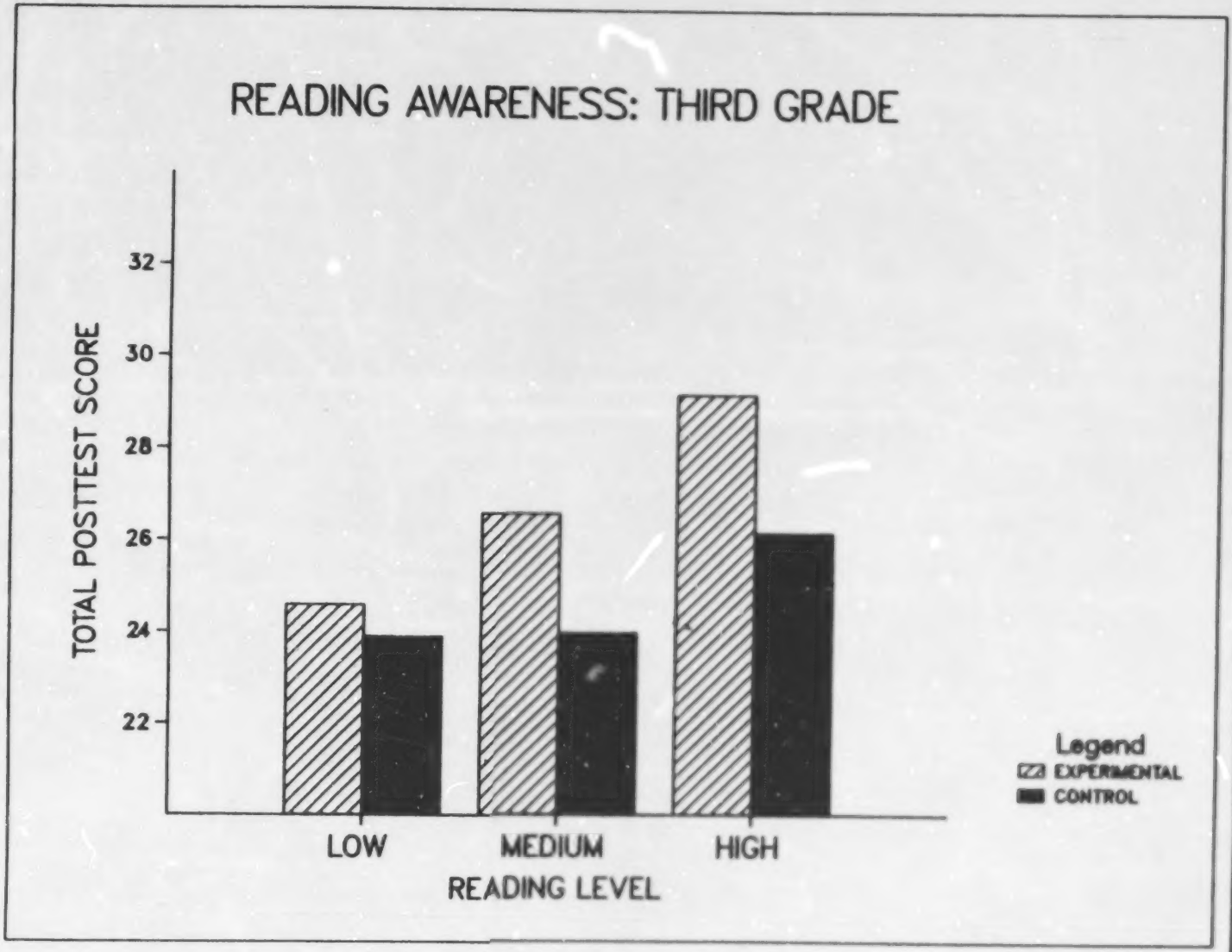

Figure 3. Third grade reading awareness at three levels of reading ability.

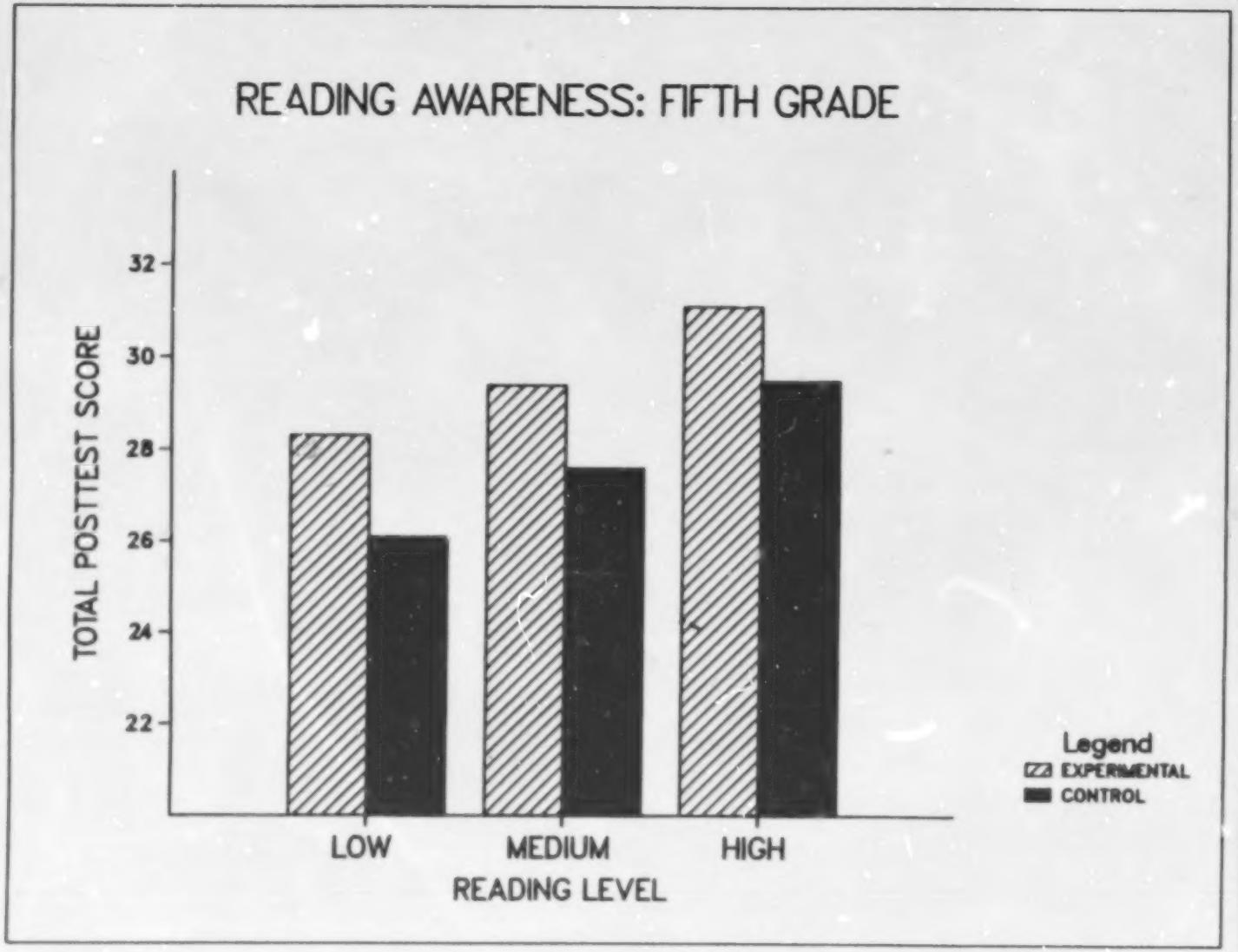

Figure 4. Fifth grade reading awareness at three levels of reading ability.

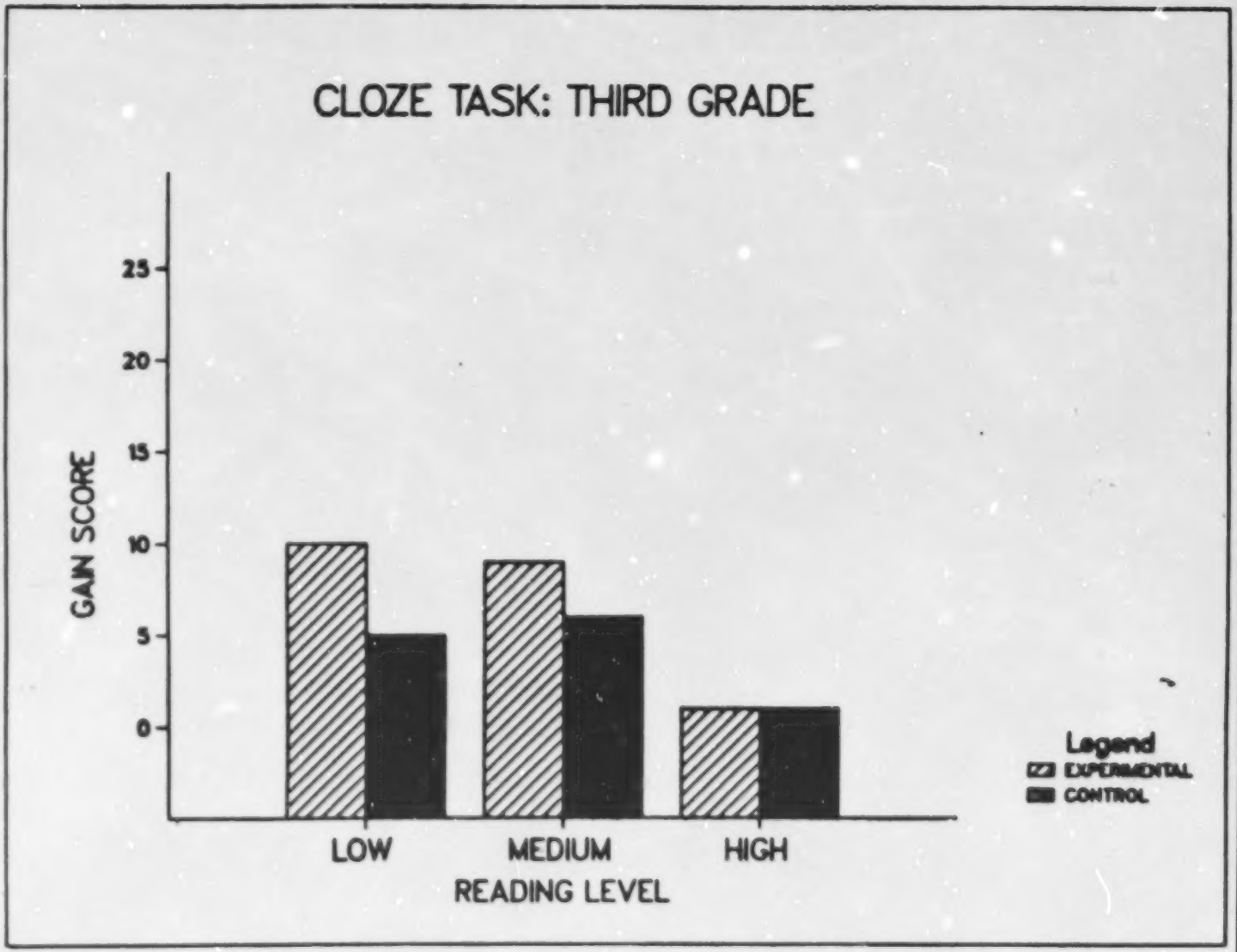

Figure 5. Pre-test to post-test cloze task gains scores for the third grade sample. (Gain score units are in tenths.)

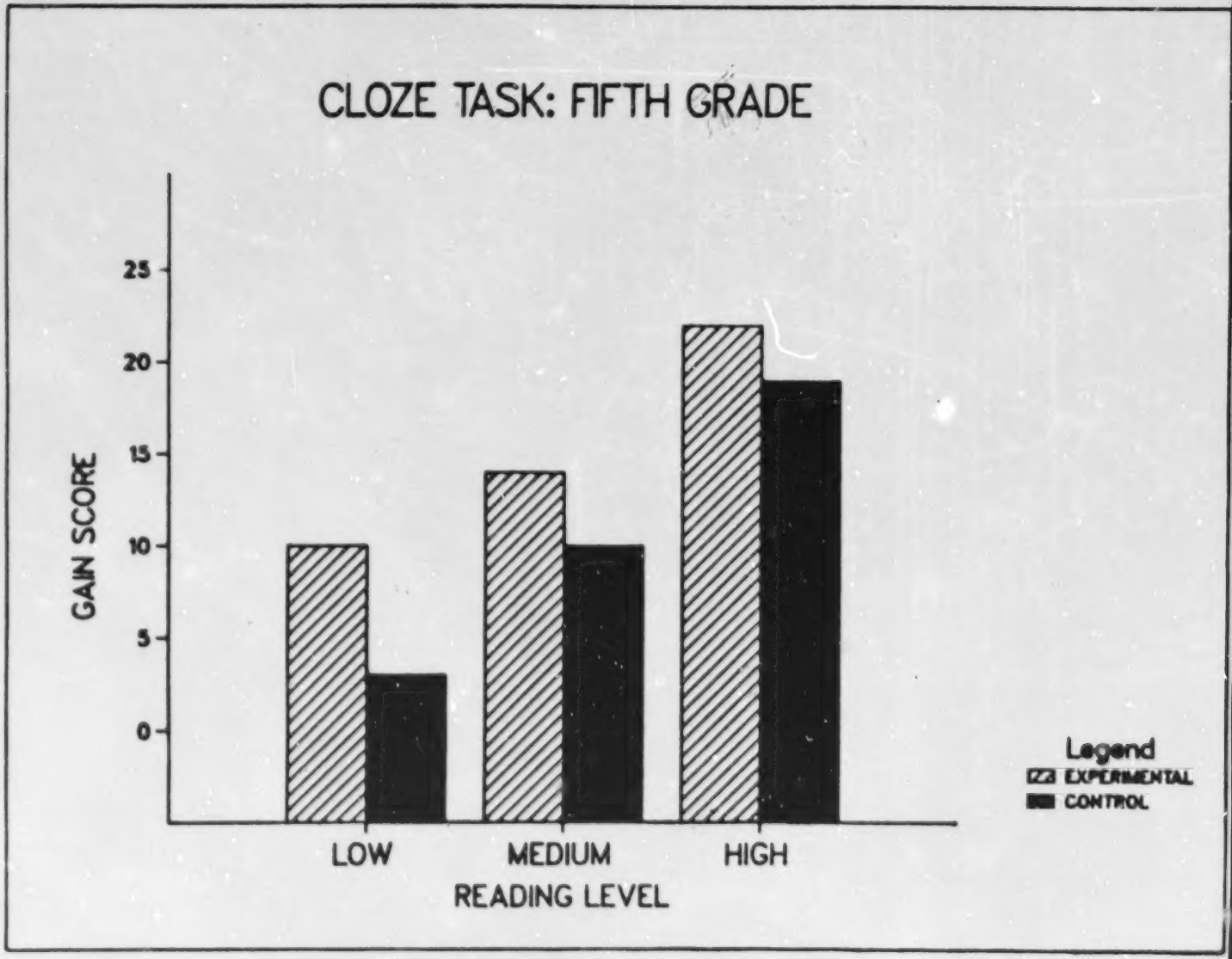

Figure 6. Pre-test to post-test cloze task gains scores for the fifth grade sample. (Gain score units are in tenths.)

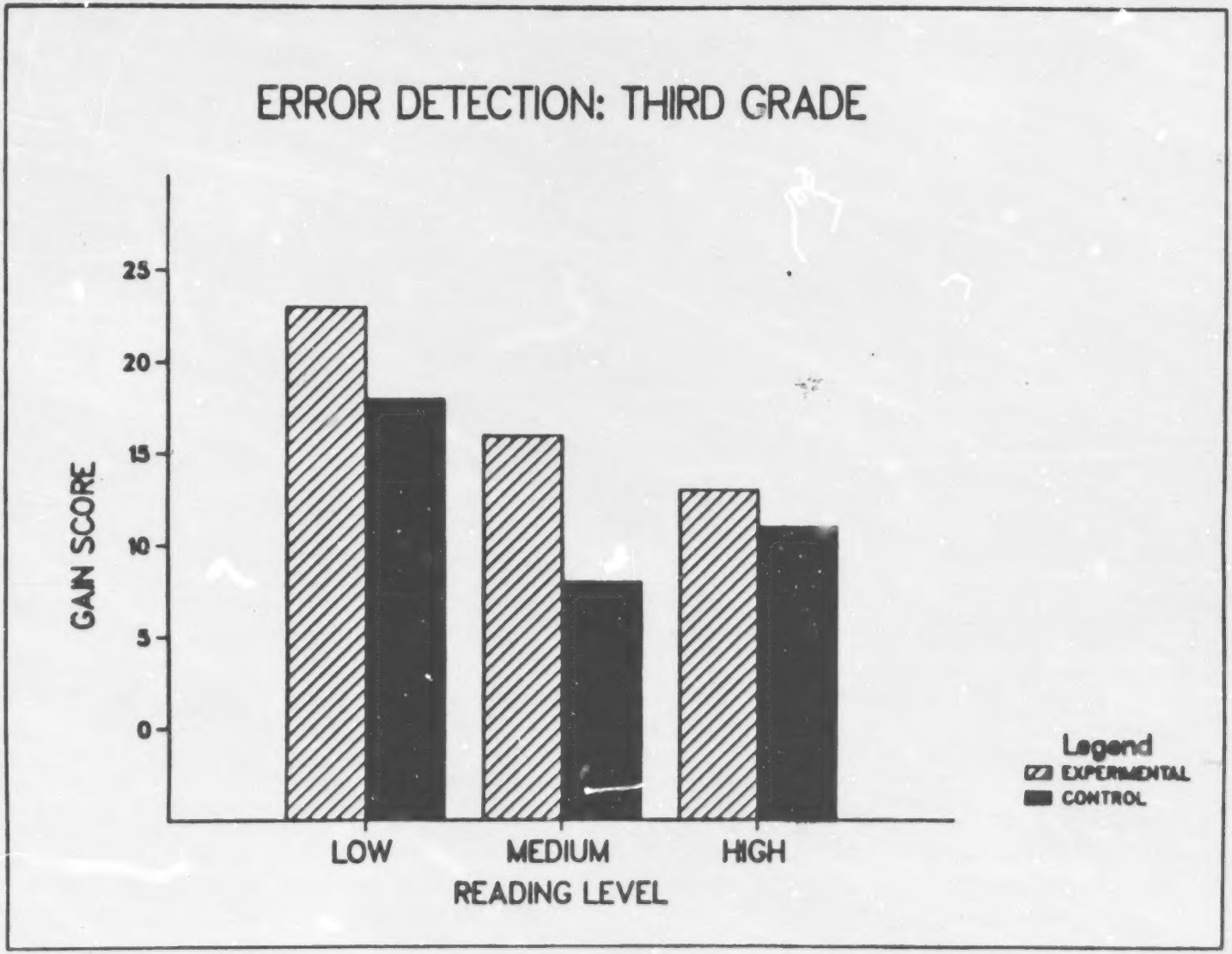

Figure 7. Pre-test to post-test efficiency gain scores for the third grade sample. (Gain score units are in hundredths.)

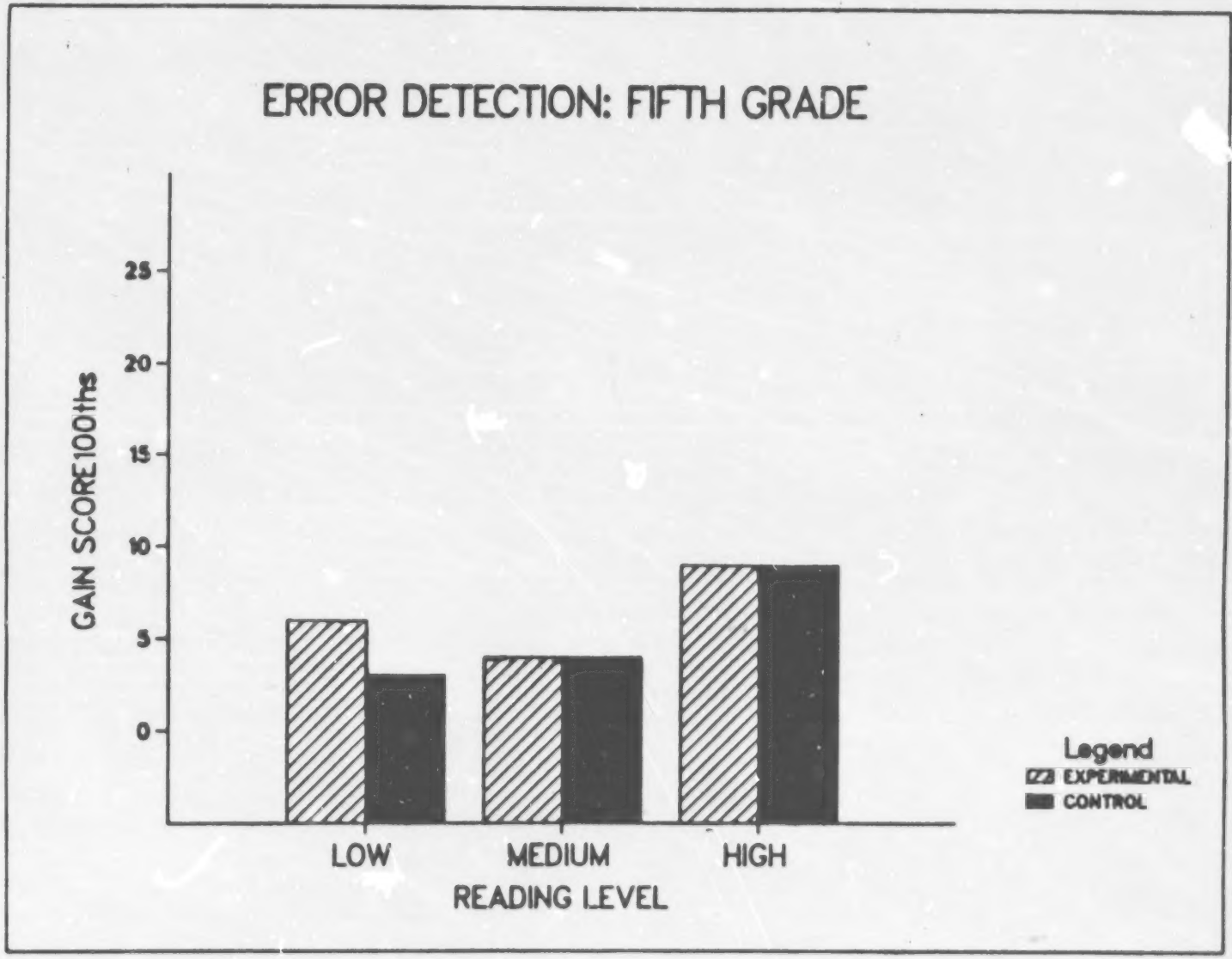

Figure 8. Pre-test to post-test efficiency gain scores for the fifth grade sample. (Gain score units are in hundredths.)

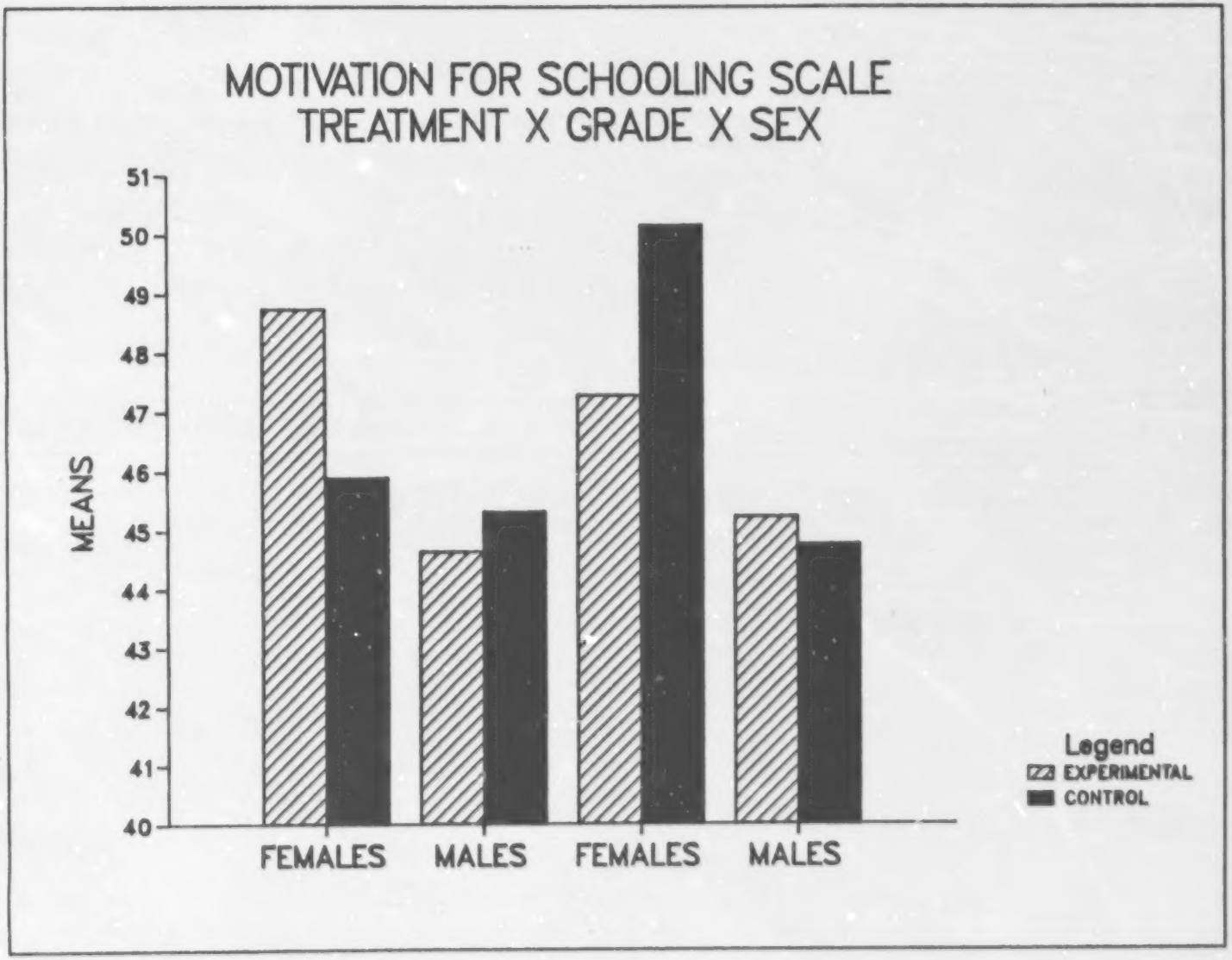

Figure 9. Motivation for Schooling Scale.

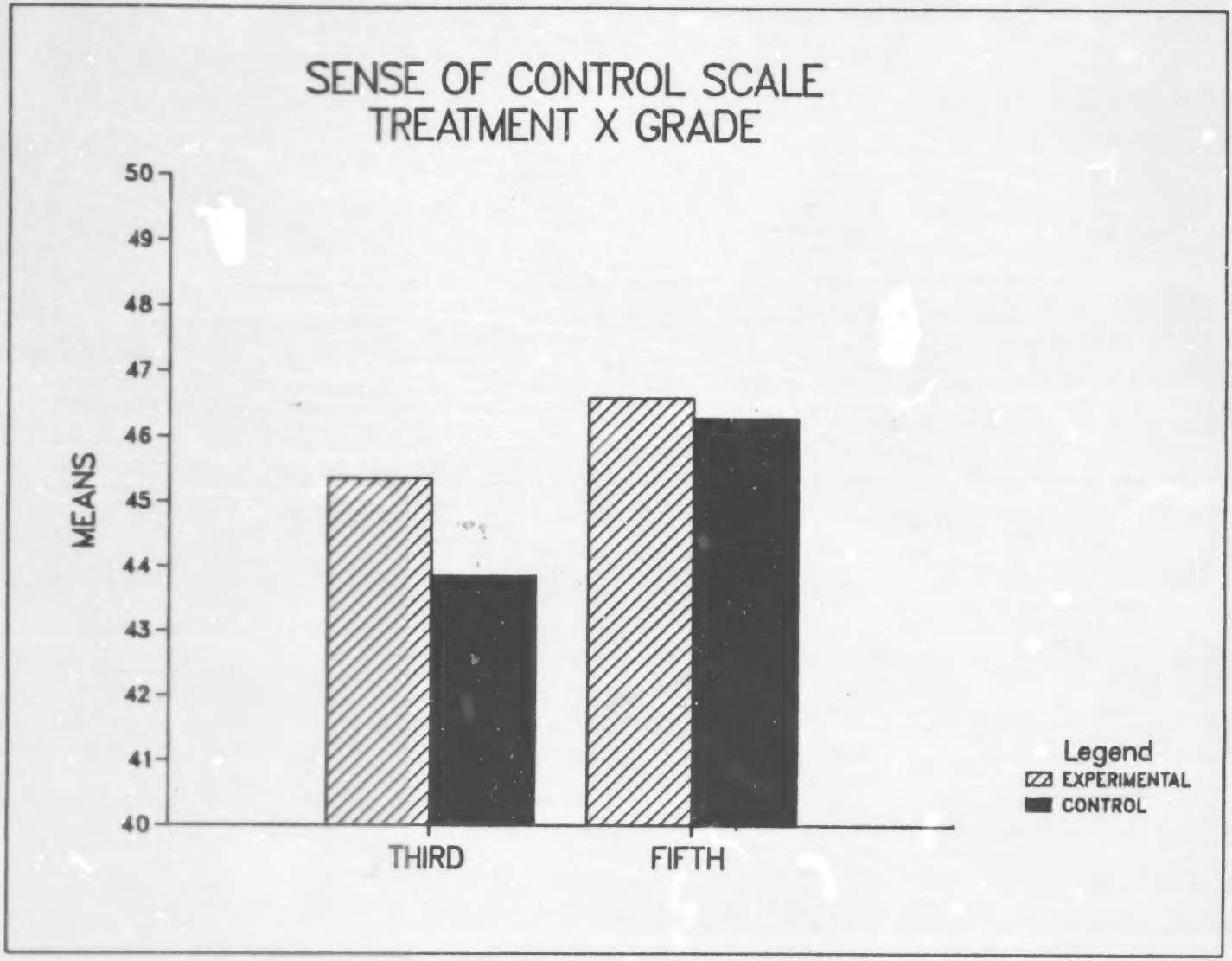

Figure 10. Sense of Control Scale.

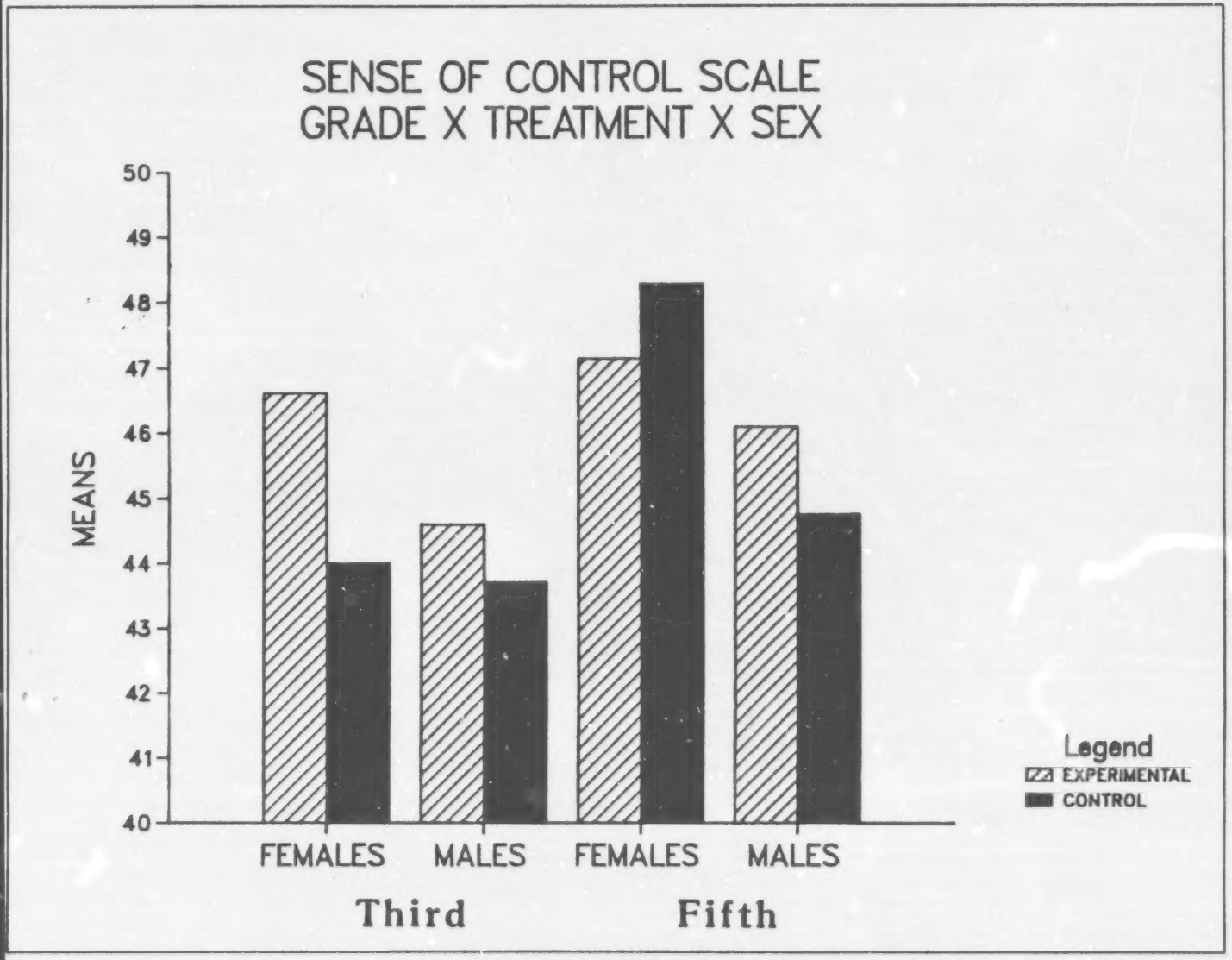

Figure 11. Sense of Control Scale.

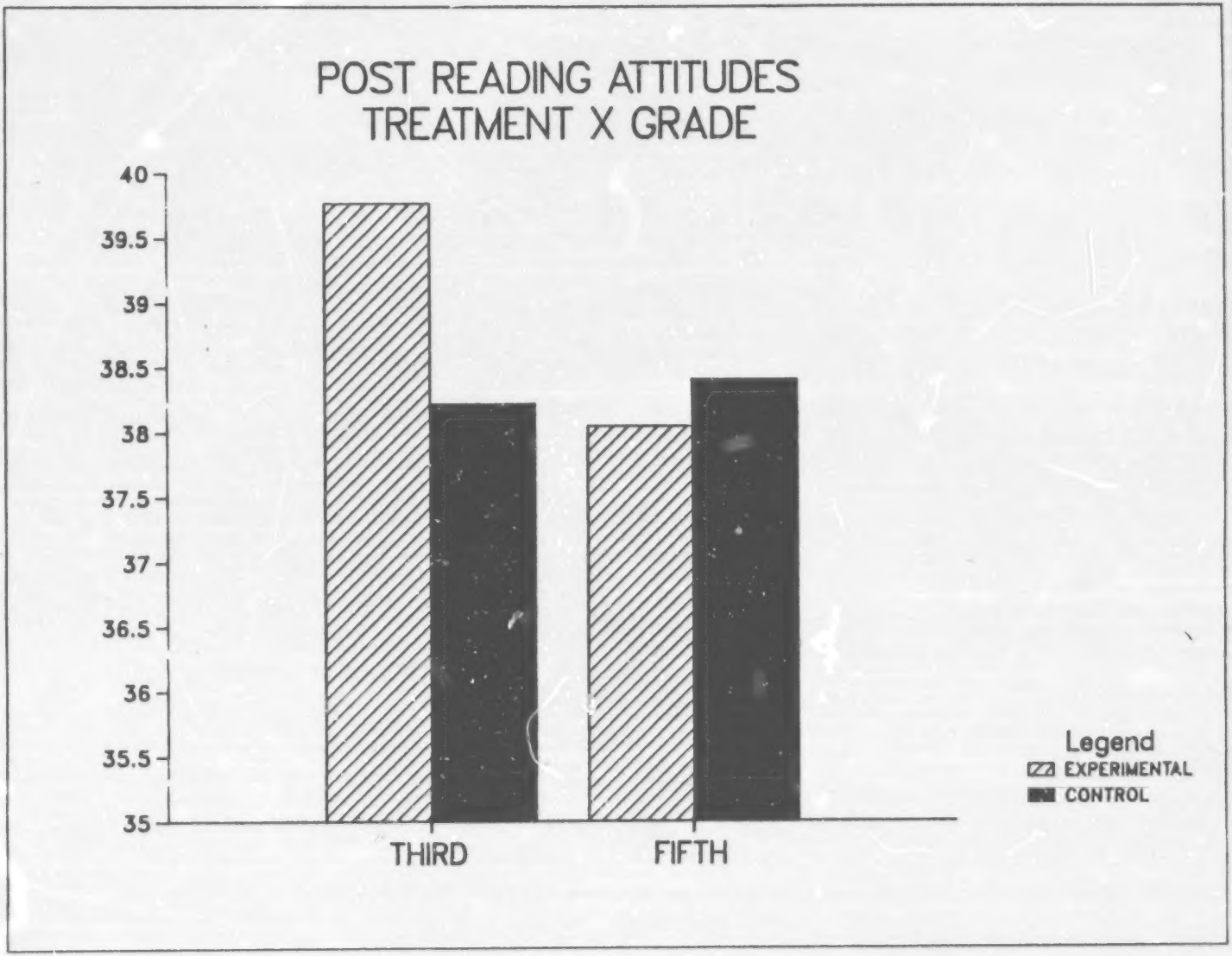

Figure 12. Post Reading Attitudes.

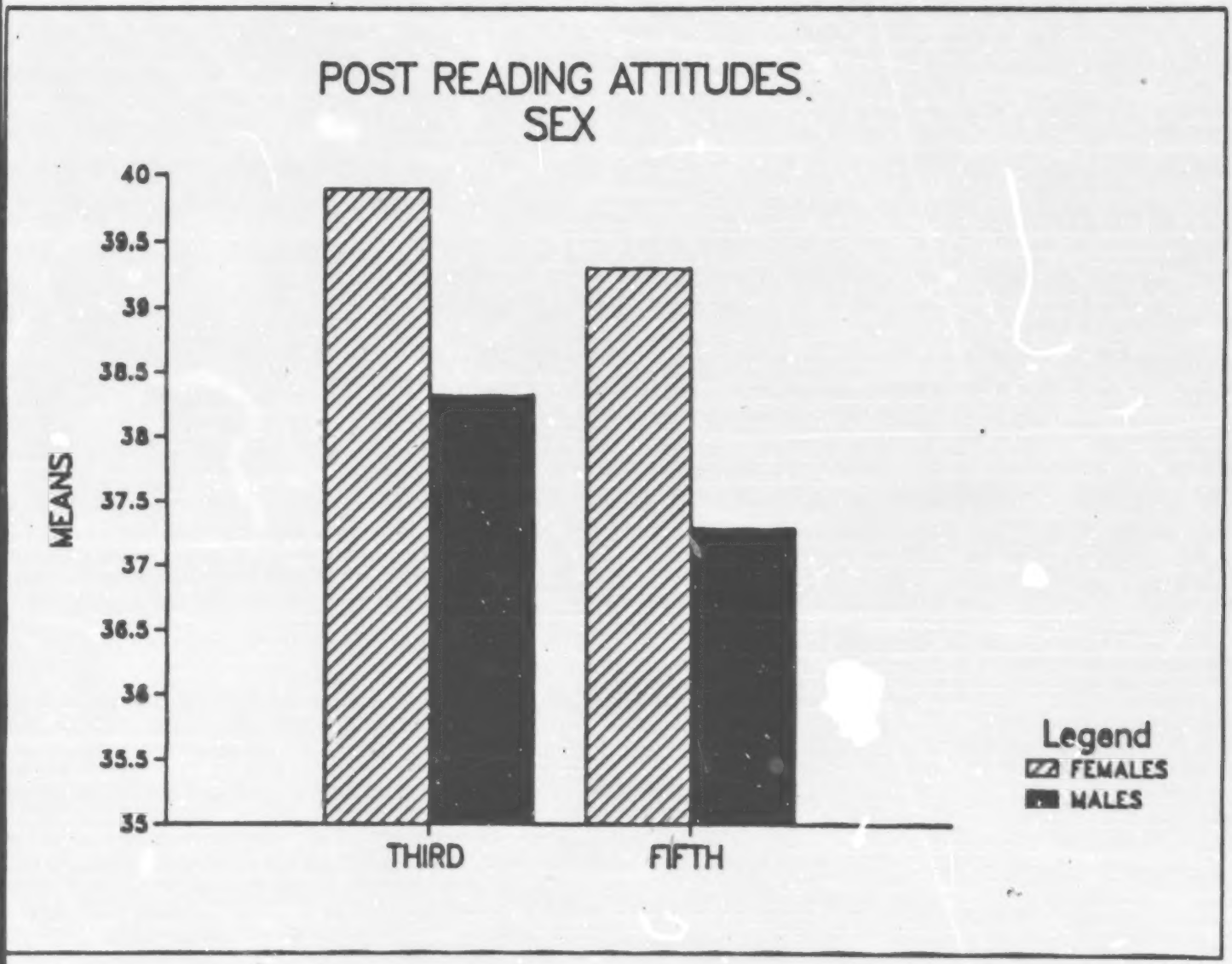

Figure 13. Post Reading Attitudes.

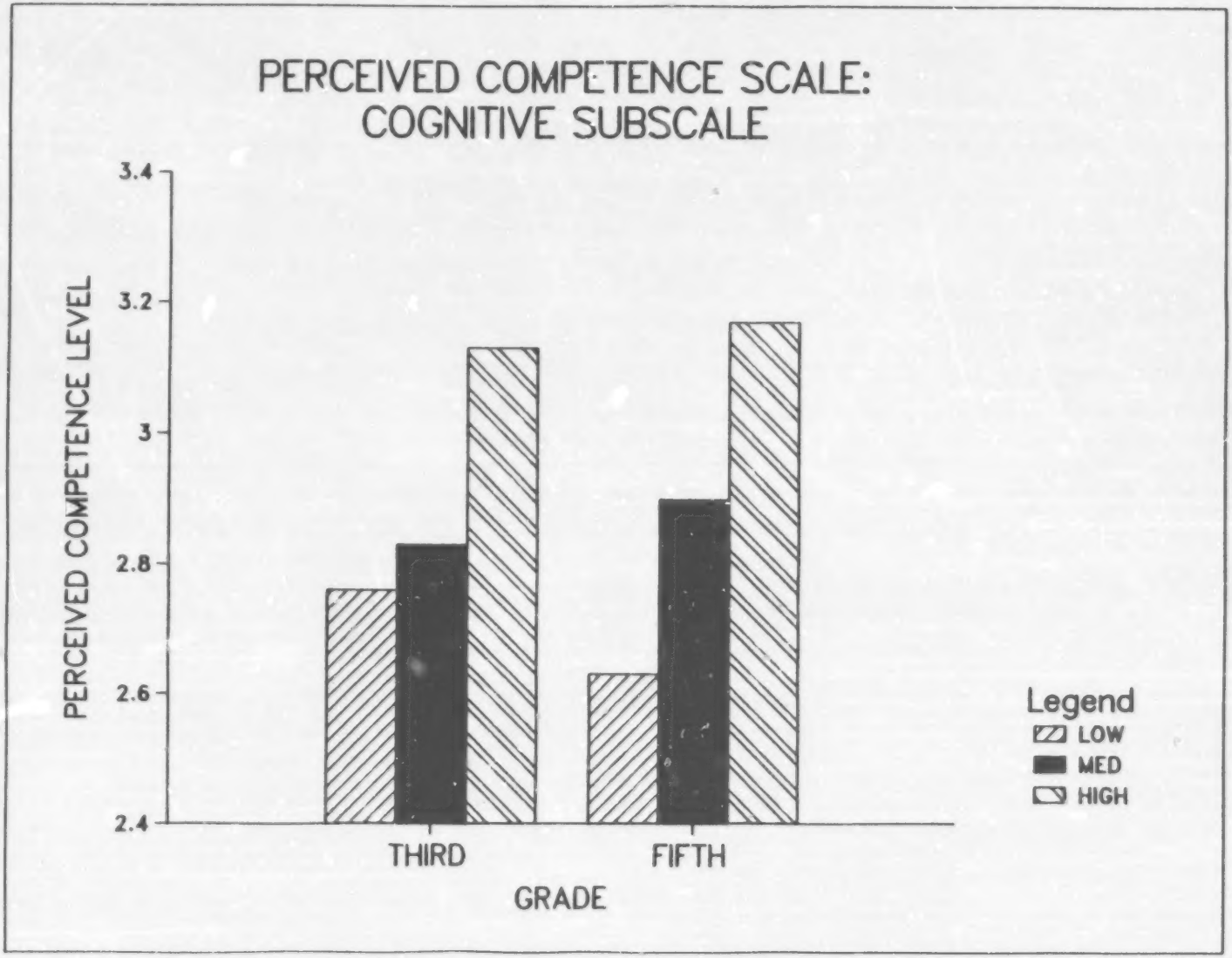

Figure 14. Perceived Competence Scale: Cognitive Subscale.

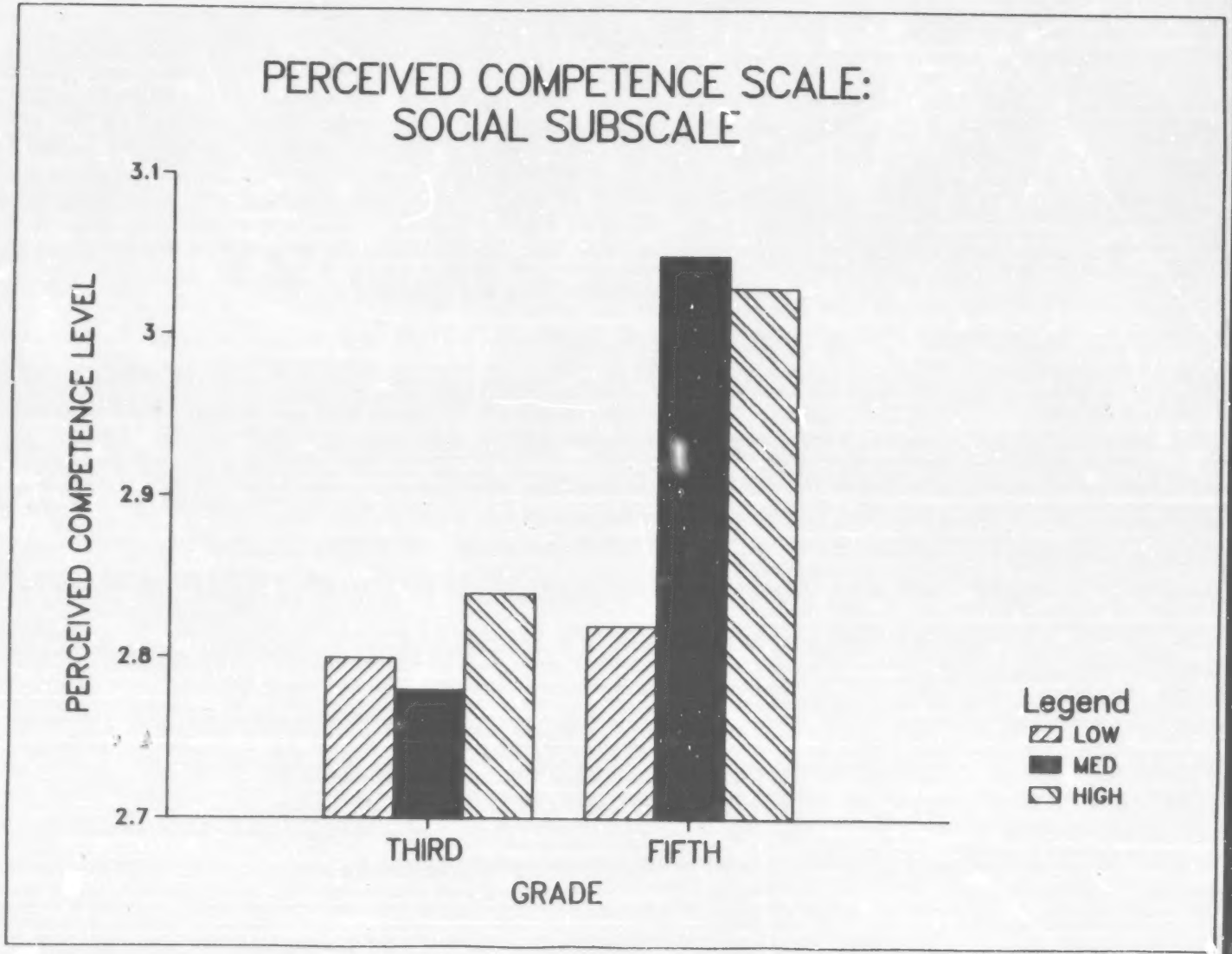

Figure 15. Perceived Competence Scale: Social Subscale.

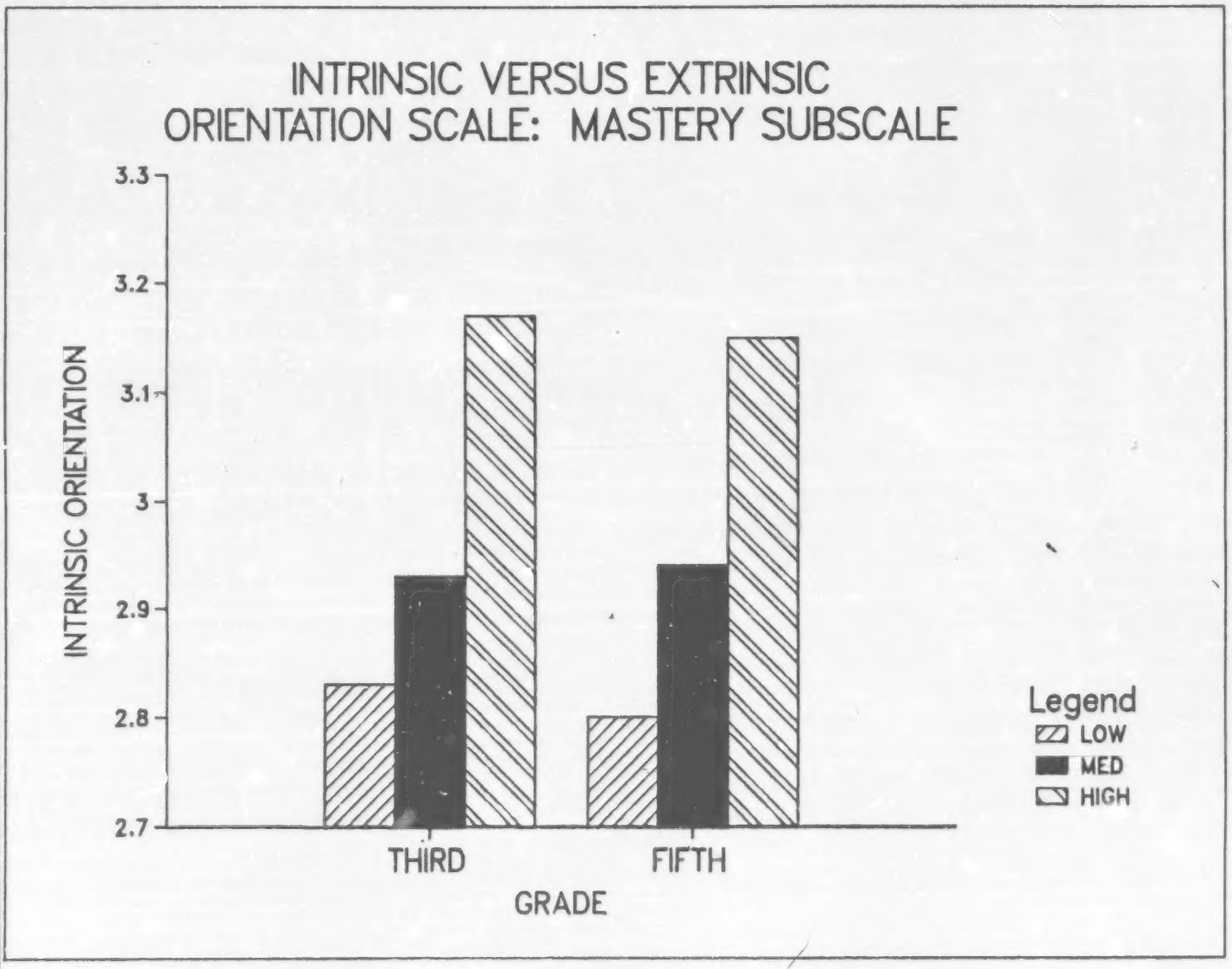

Figure 16. Intrinsic Versus Extrinsic Orientation Scale: Mastery Subscale.

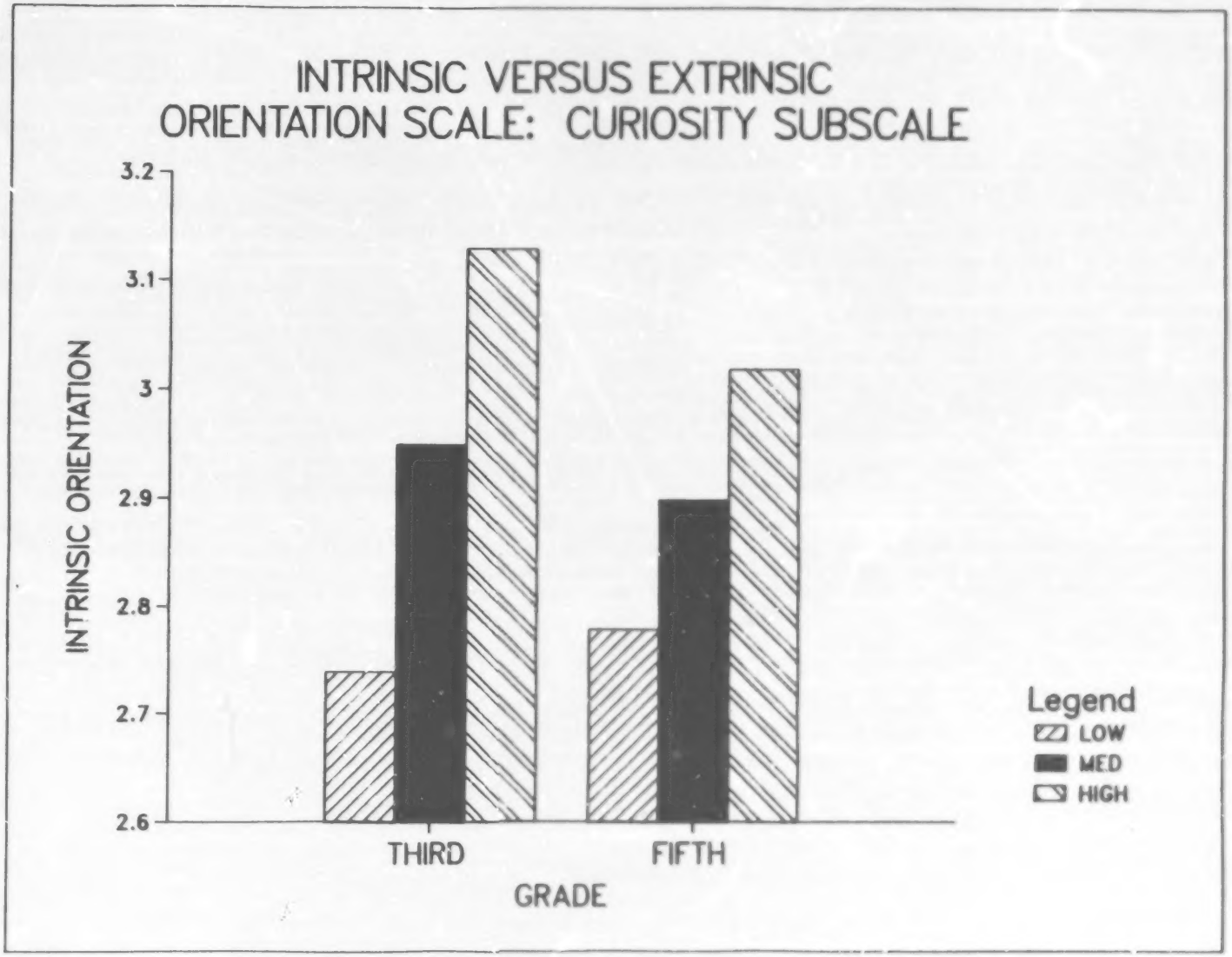

Figure 17. Intrinsic Versus Extrinsic Orientation Scale: Curiosity Subscale.

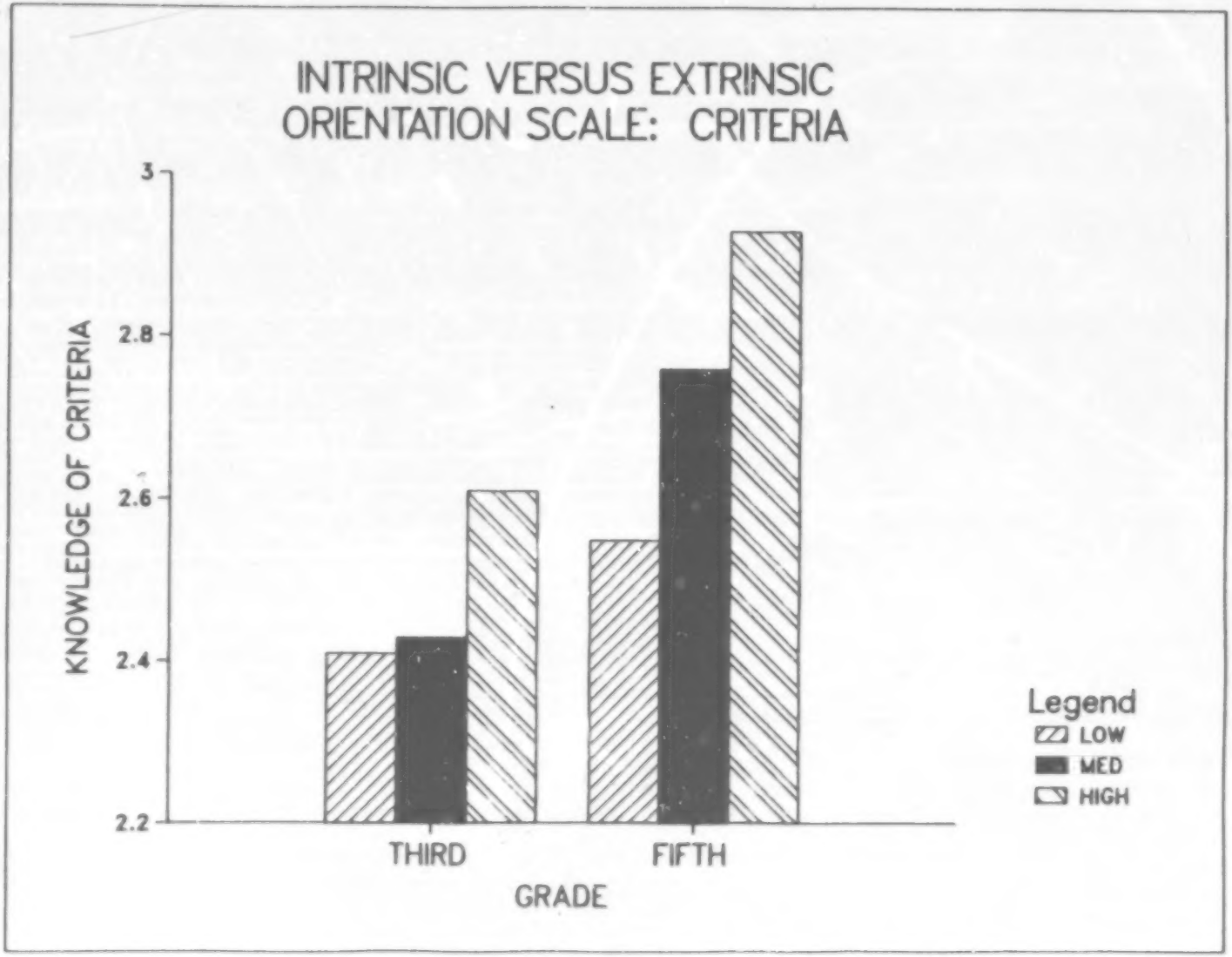

Figure 18. Intrinsic Versus Extrinsic Orientaticn Scale: Criteria.

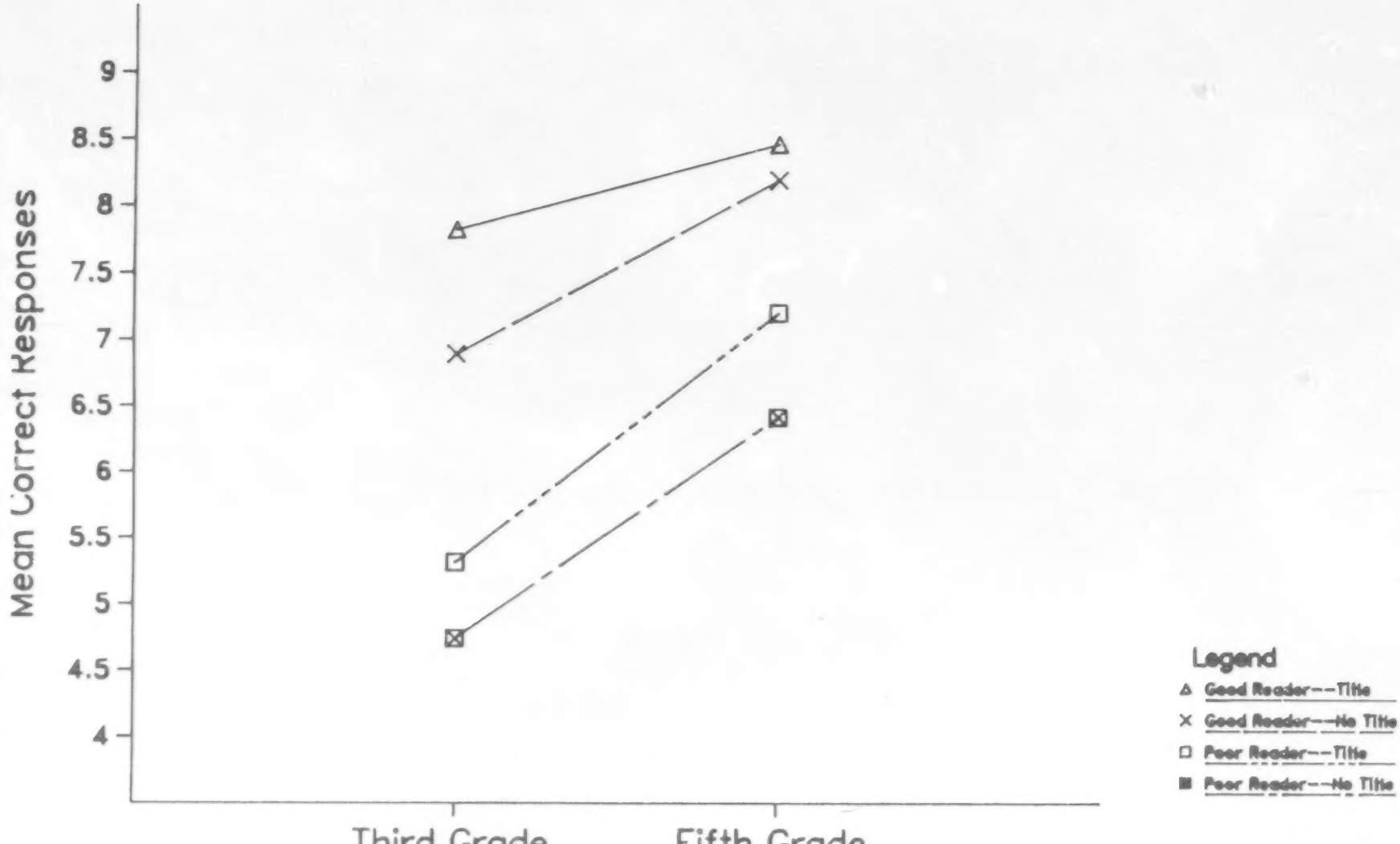

Figure 19. Correct Responses by Grade, Reader Ability, and Title.

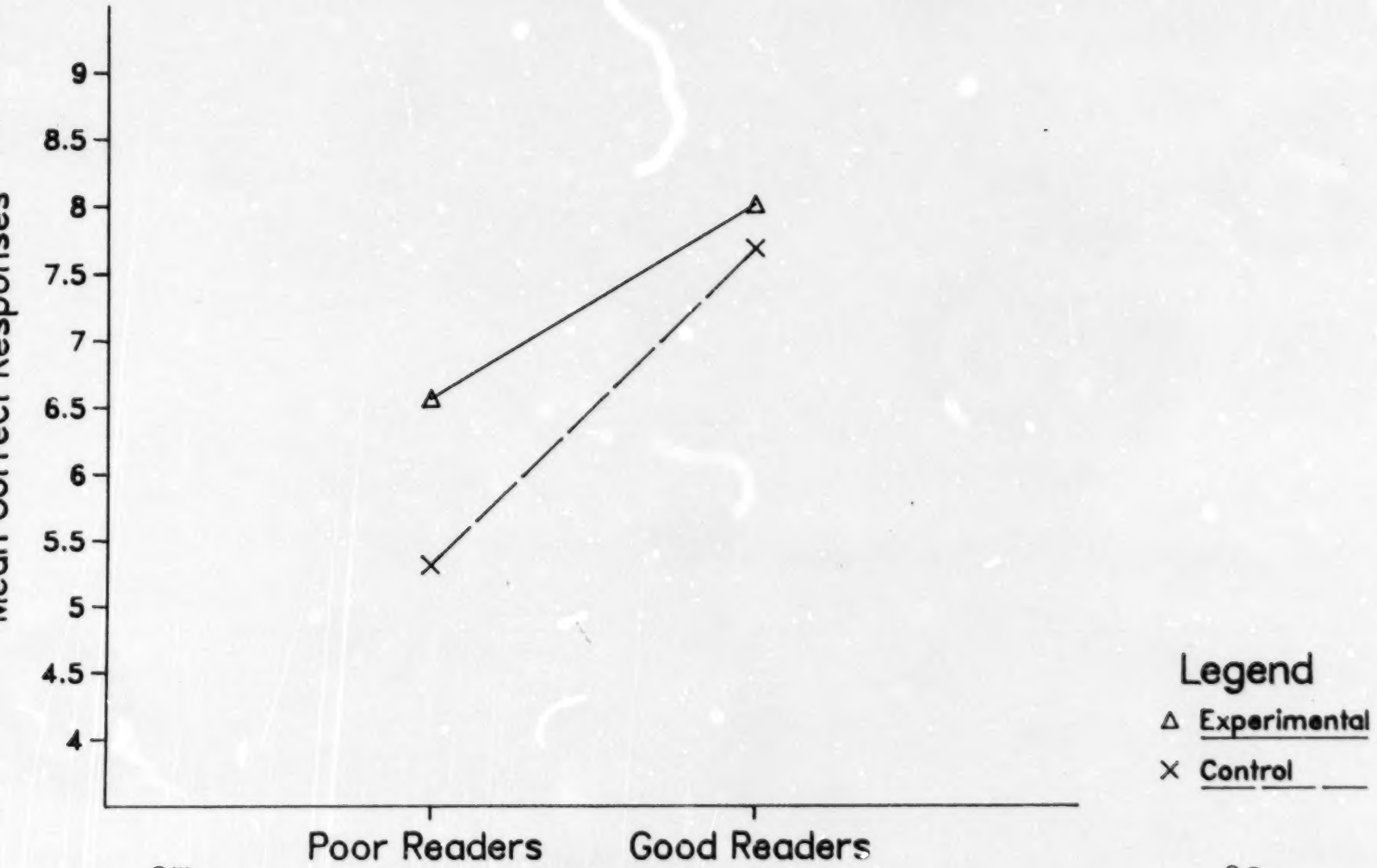

Figure 20. Correct Responses by Reader Ability and Treatment.

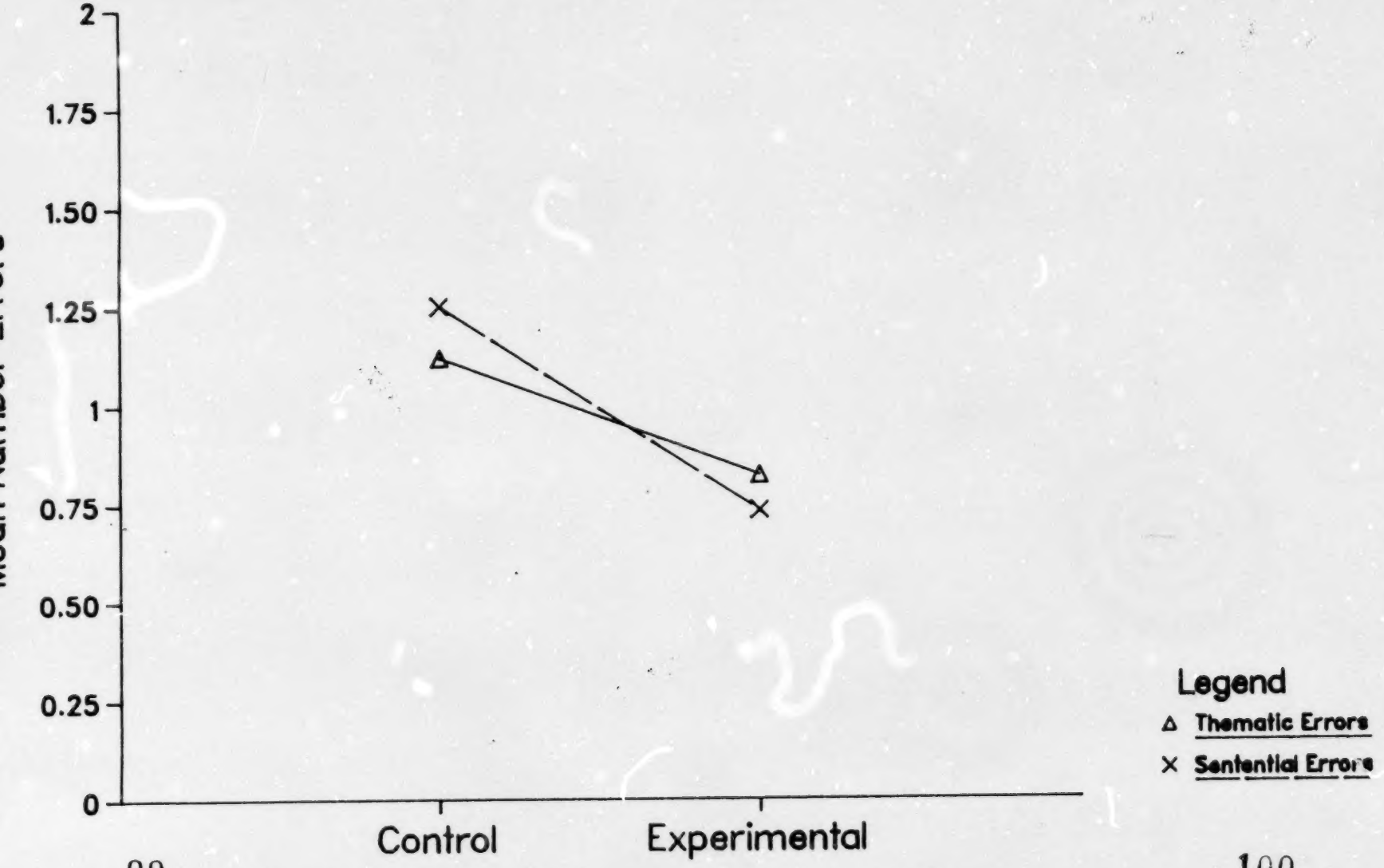

Figure 21. Errors by Treatment and Error Type.

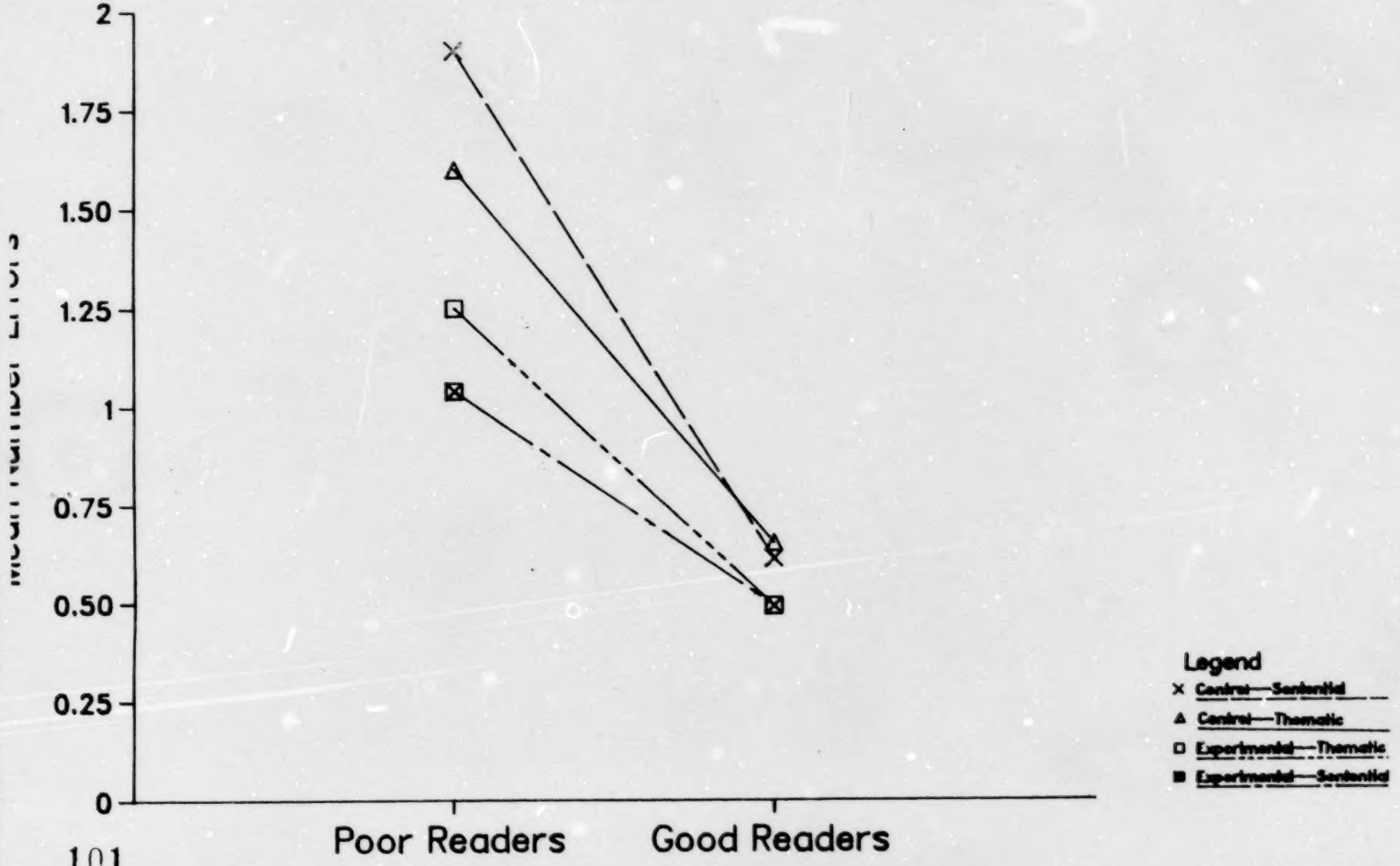

Figure 22. Errors by Reader Ability, Treatment, and Error Type.